

# High-Speed Regional Transportation System Alternatives Analysis

*Appendices*

## final appendices

*prepared for*

**Southern California Association of Governments**

*prepared by*

**Cambridge Systematics, Inc.**

*with*

SYSTRA Consulting, Inc.  
System Metrics Group



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*date*

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# 1.0 Engineering - Details

The High-Speed Regional Transportation (HSRT) Alternatives Analysis (AA) evaluates high-speed transportation technologies within the Initial Operating Segment (IOS) corridor from West Los Angeles to Ontario Airport. Four alternatives are evaluated in the study:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on Union Pacific Railroad (UPRR) alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. This appendix contains details related to the development of engineering information for the four alternatives.

## 1.1 I-10 ALIGNMENT

The I-10 alignment, with a general east-west orientation, was taken from a single set of drawings that use English units entitled, *Maglev Deployment Program, Phase II*, prepared for SCAG by the IBI Group and Maglev, Inc., as Work Element Number 05-240.SCGC1.2, and last dated July 28, 2006. Of specific importance are the Plan and Profile Sheets numbered 1-59.

Viewed west to east, the alignment begins at station 106+50, just west of the westerly platform limit of the proposed West Los Angeles station. It proceeds easterly past the proposed Los Angeles Union Station (LAUS) and West Covina stations to end at station 2956+61, just east of the easterly platform limit of the proposed Ontario Airport station.

The alignment drawings identify the limits and characteristics of the horizontal curves (circular and spiral) and vertical profile. Vertical curves are not parabolic but circular, with each Vertical Curve Radius (VCR) specified.

The typical cross section on the I-10 alignment is a two-track elevated structure, noted as urban aerial on the drawings.

## 1.2 UPRR ALIGNMENT

The UPRR alignment, also with a general east-west orientation, was taken from two sets of drawings that use metric units:

1. On the west end, a set of drawings entitled *Los Angeles - Riverside - San Diego, Union Station to Pomona Station via Union Pacific, Segment 1-B (joins Segment 1A*

at Pomona), taken from the California High-Speed Train Program Environmental Impact Report, prepared for the California High Speed Rail Authority (CHSRA), consisting of Sheets 1-4 of 4 plus an Index sheet, and dated August 14, 2002; and

2. On the east end, a set of drawings entitled *Los Angeles - Riverside - San Diego, Union Station to March ARB via SP Colton Line, Segment 1-A*, taken from the California High-Speed Train Program Environmental Impact Report, prepared for the CHSRA, consisting of Sheets 1-8 of 8 plus two Index sheets, and dated August 14, 2002.

Viewed west to east, the UPRR alignment begins at the west end of Segment 1-B at Station 1-B 2+100.00, at the westerly platform limit of the proposed HSRT station at Union Station. It proceeds easterly (with stationing increasing) along Segment 1-B past the proposed Union Station, South El Monte, and City of Industry Stations to meet Segment 1-A at station equation 1-B 53+691.96 = 1-A 51+678.41. It then continues easterly along Segment 1-A (with increasing stationing) past the proposed Pomona Station to end at the easterly platform limit of the proposed Ontario Airport Station, at Station 1-A 67+810.00. The HSRT system does not include stations at South El Monte and Pomona, so these were excluded in the analysis.

The typical cross section used on the CHSRA alignment is a two-track elevated structure, noted as urban aerial on drawings.

The above drawings include several at-grade segments. Most of these were modified to aerial due to numerous at-grade road crossings within these segments. At-grade road crossings are infeasible with the Maglev mode, and are not allowed at higher speeds with the steel-wheel mode.

## 1.3 HORIZONTAL CURVES

Using the given alignments, AREMA standards were used to calculate speeds that the current geometry could adequately handle, while still remaining within the 0.1 g lateral acceleration standard established for HSRT. This lateral acceleration equates to an unbalance of 5.99 inches.

$$A_{lat} = 0.1 \times g (ft / s^2)$$

$$V = \text{Velocity} (ft / s)$$

$$E = \text{Superelevation} (in.)$$

$$R = \text{Radius} (ft)$$

$$\text{If } A_{lat} = V^2 / R$$

$$\text{And } V = 0.5 \sqrt{E \times R}$$

$$\text{Then } E_{(A_{lat}=1g)} = 5.99 \text{ inches}$$

However, it is insufficient to assume an unbalance of 5.99 inches at all curves. The lateral acceleration and jerk rate within the spiral must also be considered. From Chapter 11, Section 3.5.7.9 of AREMA, the equation is:

$$L_s \geq (A_{lat} / J) \times (E_u / E_{u_{max}}) \times 1.46V$$

$$L_s = \text{Spiral Length (ft)}$$

$$A_{lat} = \text{Lateral Acceleration (g)}$$

$$J = \text{Jerk Rate (ft / sec}^3\text{)}$$

$$E_{u_{Max}} = \text{Maximum Unbalanced (inch)}$$

**Unbalance (Eu).** Assuming a maximum lateral acceleration of 0.1 g, jerk rate of 0.03 g per second as recommended by AREMA and the maximum unbalanced of 5.99 inches gives  $L_s \geq 0.811E_u \times V$ .

**Superelevation (Ea).** Superelevation was assumed to be runoff at a maximum rate of one-half inch per 62 feet of spiral, which is consistent with Class 9 railroad traveling at 200 mph.

The UPRR alignment calculations were, therefore, performed to determine the maximum safe speeds, using  $E_a = L_s / 124$  and  $E_u = L_s / 0.811V$  for the existing spiral lengths.

The spirals shown on the UPRR alignment did not maximize the unbalance and/or superelevation. We recalculated spiral lengths so that higher speeds could be reached while maintaining radii. This is the only change made to the horizontal alignment, resulting in insignificant changes to stationing and keeping the alignment within the proposed right-of-way.

Spirals on the I-10 alignment were not adjusted, as they were designed for maximum speed for the lengths of the curves.

Curves were analyzed to determine which ones may be optimized in the following way:

- The maximum allowed superelevation for steel-wheel vehicles is 7 inches, which would require 868-foot spirals. The maximum allowed superelevation for Maglev vehicles is 12 degrees, which is equivalent to 12 inches, which would require 1,488-foot spirals. However, a minimum curve length of  $3.66V$  (where  $V = \text{mph}$  and  $L_C = \text{ft}$ ) must be satisfied to meet the required minimum of 2.5 seconds of travel time on the curve. Where curves were sufficiently long, the maximum speed was calculated using 5.99 inches unbalanced and superelevations of 7 inches for steel-wheel and 12 inches for Maglev.
- For curves where the spirals could be lengthened but not to a sufficient length to achieve the maximum allowable superelevation, an iterative process was used to calculate speed restrictions. Velocity is a function of superelevation, unbalance, and radius. Unbalance is a function of speed and length of spiral. Therefore, multiple iterations were performed to obtain the final speed, spiral length, and superelevation. A trial speed was chosen

which determined the minimum length of curve and maximum length of spiral for that speed:  $L_{Spiral\ New} = L_{curve} + L_{spiral} - (3.66 \times V)$ .

- An actual superelevation and unbalance were then calculated for that spiral length, which were then used to determine the speed. This process was repeated until the two speeds converged.

Maglev curve speed information was provided by TransRapid International (TRI) in the system planning document, *TransRapid Maglev System Concept Alignment Overview*, prepared by TRI/Thyssen Krupp, and dated February 5, 2003. Table 1, “Minimum and Standard Alignment Parameters for Creation of a Concept Alignment,” lists horizontal and vertical curve criteria required for speed at 200, 250, 300, 400, and 500 kph (125, 155, 186, 249, and 311 mph). Speeds for the Maglev technology on both the I-10 and UPRR alignments were determined by using the methodology described above, and checked against the TRI data. The resulting curve speeds were similar to the TRI information, indicating that, while TRI did not provide a specific lateral jerk rate or superelevation runoff rate, the rates used for steel-wheel are similar to what was used to develop the TRI curve speed tables.

## 2.0 Operating Parameters – Details

The HSRT AA evaluates high-speed transportation technologies within the IOS corridor from West Los Angeles to Ontario Airport. Four alternatives are evaluated in the study:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on UPRR alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. This appendix contains details related to the development of operating parameter information for the four alternatives.

### 2.1 ROLLING STOCK

Both the steel-wheel and the Maglev-simulated rolling stock were based upon dimensions of the Siemens Velaro E, a high-speed train derived from the Siemens ICE® 3 of German Rail (DB AG). Dimensional specifications for the train were taken from literature provided by Siemens entitled, *High-Speed Train, Velaro E for the Spanish National Railways, Order No. A19100-V800-B720-X-7600*. It is an 8-car train set. It is 200 meters in length, has an empty weight of 425 metric tons, and carries 400 passengers. Specific operating parameters were changed for use of the rolling stock with each technology, as described below.

### 2.2 ACCELERATION AND BRAKING

Simulation of both acceleration and braking of the rolling stock for each of the two technologies were first performed on level tangent track in order to calibrate the equipment performance with the specifications that had been received (as cited below). When the performance for each rolling stock type had been brought into good agreement with the manufacturers' documented performance on level tangent track, then the train consist could be simulated on the actual project alignments with confidence, and projected travel times could be generated.

## Steel-Wheel

### *Acceleration Performance*

The above-cited technical specifications for the Siemens Velaro E listed traction power (at the wheel) of 8,800 kW and a time to accelerate from 0 to 320 kph of 380 seconds. Table 2.1 lists the critical Train Performance Calculator (TPC) settings for the acceleration performance calibration test.

**Table 2.1 Steel-Wheel Acceleration**  
*TPC Settings*

| Description                       | Value                                 |
|-----------------------------------|---------------------------------------|
| Train name                        | SCAG Velaro E (5588) 8-car half-train |
| Resistance equation               | TGV High-Speed Rail                   |
| System maximum speed              | N/A                                   |
| Velocity smoothing                | None                                  |
| Jerk limiting                     | Yes                                   |
| Schedule margin calculation       | None                                  |
| Passenger load                    | Empty                                 |
| Average passenger weight:         | N/A                                   |
| Continuous power per car          | 1,222 kW*                             |
| Propulsion system efficiency      | 90%                                   |
| Percent of train mass in rotation | 5%                                    |
| Total axles/powering axles        | 32/16                                 |
| Maximum adhesion                  | 14%**                                 |

\* Tractive power at wheel for an 8-car train of 8,800 kW (Siemens literature). Therefore, average tractive power at wheel per car of 1,100 kW. Propulsion System Efficiency of 90 percent (assumed). Assumed continuous power per car =  $1,100 \text{ kW} / 0.90 = 1,222 \text{ kW}$ .

\*\* Four of the eight cars are powered. Powered cars each have assumed maximum adhesion of 28 percent. Maximum adhesion of train as a whole is 14 percent.

With these settings in place, the time to accelerate from 0 to 320 kilometers per hour in TPC simulation was 380.1 seconds, demonstrating excellent agreement with the 380-second acceleration performance cited by Siemens. The TPC run was based on the RAILSIM High-Speed Rail resistance equation, which has been used for SNCF Train a Grande Vitesse (TGV) rolling/aerodynamic resistance computations. Rolling/aerodynamic resistance of the ICE is similar to that of the TGV.

### *Braking Performance*

Siemens’ technical specifications cited above state that the braking distance required from 320 to 0 kilometers per hour is 3,900 meters. This is taken to represent full service – not emergency – braking. Table 2.2 lists the critical TPC settings for the braking performance calibration test.

**Table 2.2 Steel-Wheel Braking**  
*TPC Settings*

| Description                    | Value                                 |
|--------------------------------|---------------------------------------|
| Train name                     | SCAG Velaro E (5588) 8-car half train |
| Resistance equation            | TGV High Speed Rail                   |
| System maximum speed           | N/A                                   |
| Velocity smoothing             | None                                  |
| Jerk limiting                  | Yes                                   |
| Schedule margin calculation    | None                                  |
| Passenger load                 | Empty                                 |
| Average passenger weight       | N/A                                   |
| Brakepipe propagation type     | Electric                              |
| Comfort braking margin         | 0 percent                             |
| Enforced braking reaction time | 0 seconds                             |

A constant braking rate was assumed and computed as shown in Table 2.3.

**Table 2.3 Steel-Wheel Braking**  
*Brake Rate Computation*

|   |
|---|
| Average Speed through braking = 320 kph/2 = 160 kph = 44.44 m/s                   |
| Time to brake = 3,900 meters/44.44 m/s = 87.75 seconds                            |
| 320 kph/87.75 seconds = 3.6467 kphps service brake rate = 1.0130 m/s <sup>2</sup> |

Iterative simulations refined the solution to arrive at a service brake rate of -1.003 m/s<sup>2</sup>, resulting in a stopping distance of 3,900.41 meters.

## **Maglev**

### *Acceleration and Braking Performance*

For the Maglev rolling stock, the dimensional attributes were again taken from the Siemens Velaro E described above. However, the performance attributes were taken from a file named “System Characteristics TR Velaro Aug2007.pdf,”

received from TRI. The Maglev acceleration and braking performance therein are shown in Table 2.4 under the headings labeled “Required.”

**Table 2.4 Maglev Performance Targets and Results**

| Speed<br>(kph) | Acceleration Time<br>(in Second) |           | Deceleration Time<br>(in Second) |           |
|----------------|----------------------------------|-----------|----------------------------------|-----------|
|                | Required                         | Simulated | Required                         | Simulated |
| 0 <> 100       | 31                               | 30.5      | 30                               | 30.4      |
| 0 <> 200       | 61                               | 60.7      | 59                               | 59.9      |
| 0 <> 300       | 97                               | 95.9      | 88                               | 89.7      |
| 0 <> 400       | 148                              | 145.2     | 117                              | 119.8     |
| 0 <> 500       | 256                              | -         | 147                              | -         |

In order to attain the specified performance for the Maglev rolling stock, tractive force and braking force curves corresponding with the required performance were developed based upon the car dimensions and weight with no passengers. These curves were applied to the hypothetical Maglev train. With Flange Resistance and Mechanical Resistance both set to zero as shown (and as is appropriate for Maglev rolling stock), the only resistance component affecting the simulated train was Aerodynamic Resistance.

**Table 2.5**    **Maglev Acceleration**  
*TPC Settings*

| Description                       | Value  |
|-----------------------------------|--|
| Train name                        | MagLev (dimensionally identical to SCAG Velaro E (5588) 8-car half-train)              |
| Resistance equation               | TGV High-Speed Rail, with both Flange Resistance and Mechanical Resistance set to zero |
| System maximum speed              | 500 km/hr (311 mph)  |
| Velocity smoothing                | None   |
| Jerk limiting                     | None   |
| Schedule margin calculation       | None   |
| Passenger load                    | 0  |
| Average passenger weight          | N/A  |
| Continuous power per car          | Not computed   |
| Propulsion system efficiency      | n/a  |
| Percent of train mass in rotation | 0%   |
| Total axles/powered axles         | 0  |
| Maximum adhesion                  | n/a  |

The resulting times for simulated acceleration and braking are shown in Table 2.5 under the headings labeled “Simulated.” As can be seen, simulated Maglev performance is virtually identical to the TRI documentation for both acceleration and braking.



## 3.0 HSRT Speed Profiles

The HSRT AA evaluates high-speed transportation technologies within the IOS corridor from West Los Angeles to Ontario Airport. This appendix shows the speed profiles for the four alternatives evaluated in the study. The four alternatives are:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on UPRR alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. Speed profiles for the UPRR alignment are shown between Los Angeles Union Station (LAUS) and Ontario Airport only. For the UPRR alignment, the speed profiles between West Los Angeles and LAUS are identical to those for the I-10 alignment. The speed profiles were developed using SYSTRA's RAILSIM® Train Performance Calculator.

Figure 3.1 Speed Profile, Maglev on I-10 Alignment, Eastbound

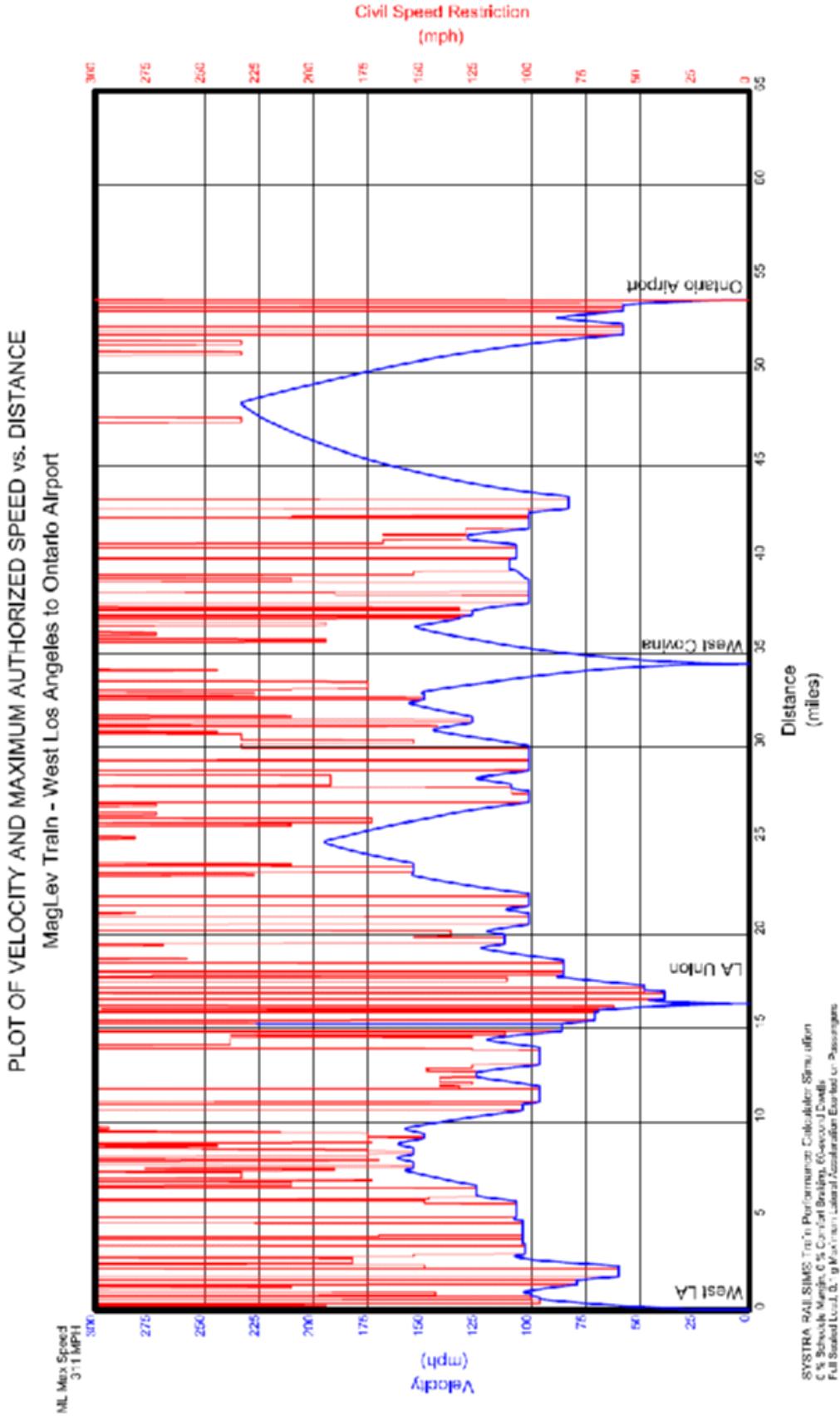


Figure 3.2 Speed Profile, Steel-Wheel on I-10 Alignment, Eastbound

PLOT OF VELOCITY AND MAXIMUM AUTHORIZED SPEED vs. DISTANCE  
Steel Wheels Train - West Los Angeles to Ontario Airport

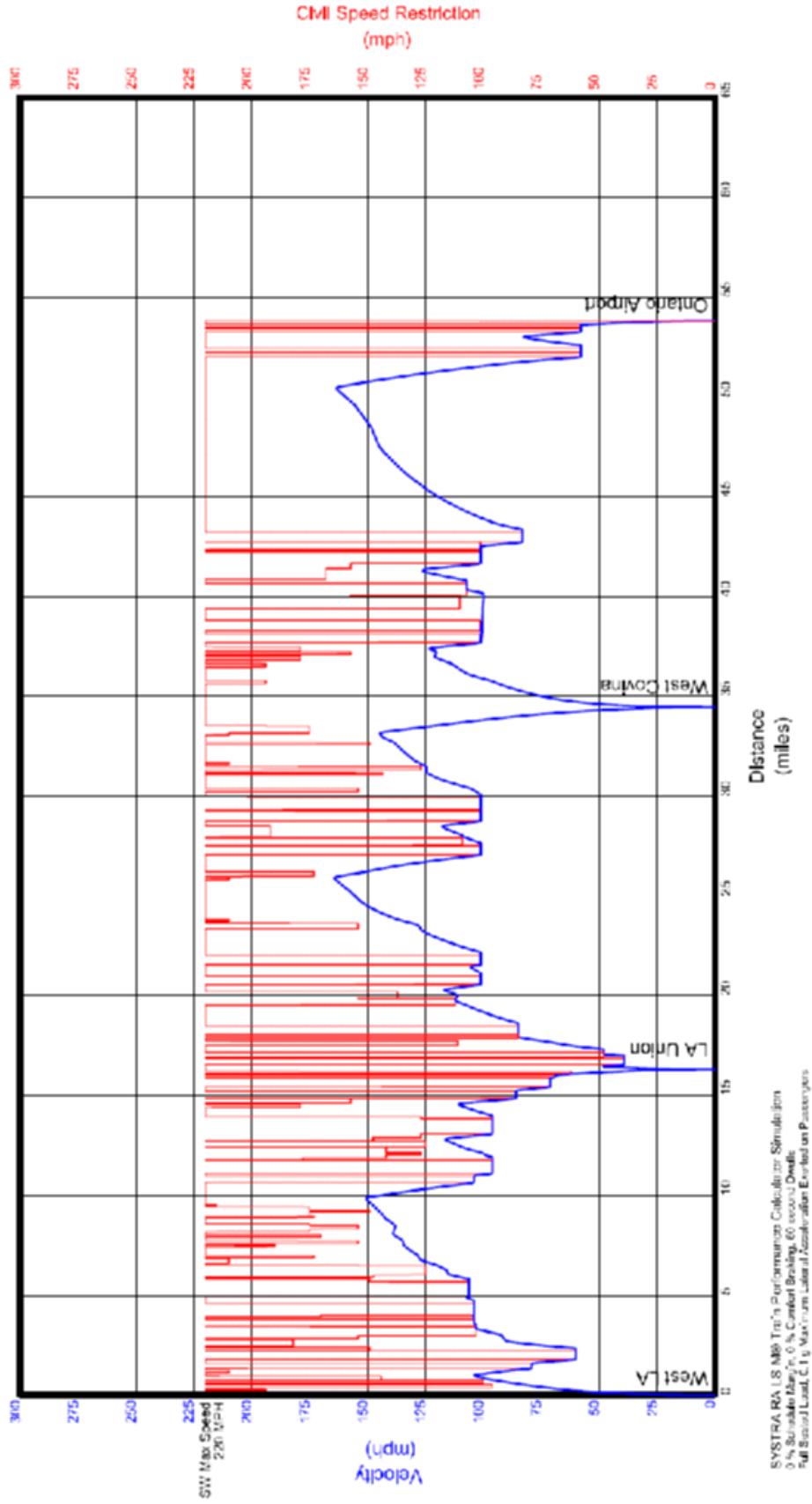


Figure 3.3 Speed Profile, Maglev on I-10 Alignment, Westbound

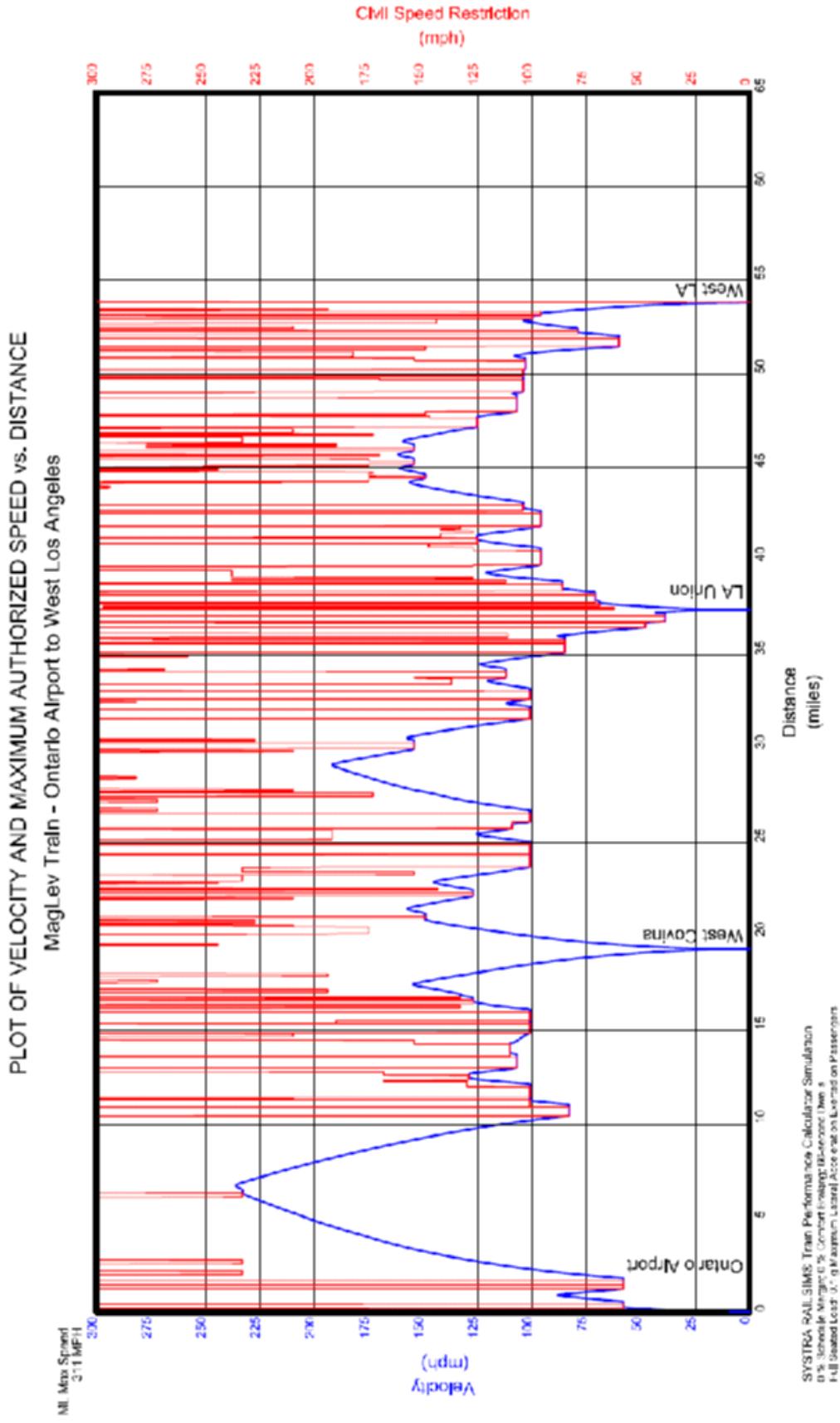


Figure 3.4 Speed Profile, Steel-Wheel on I-10 Alignment, Westbound

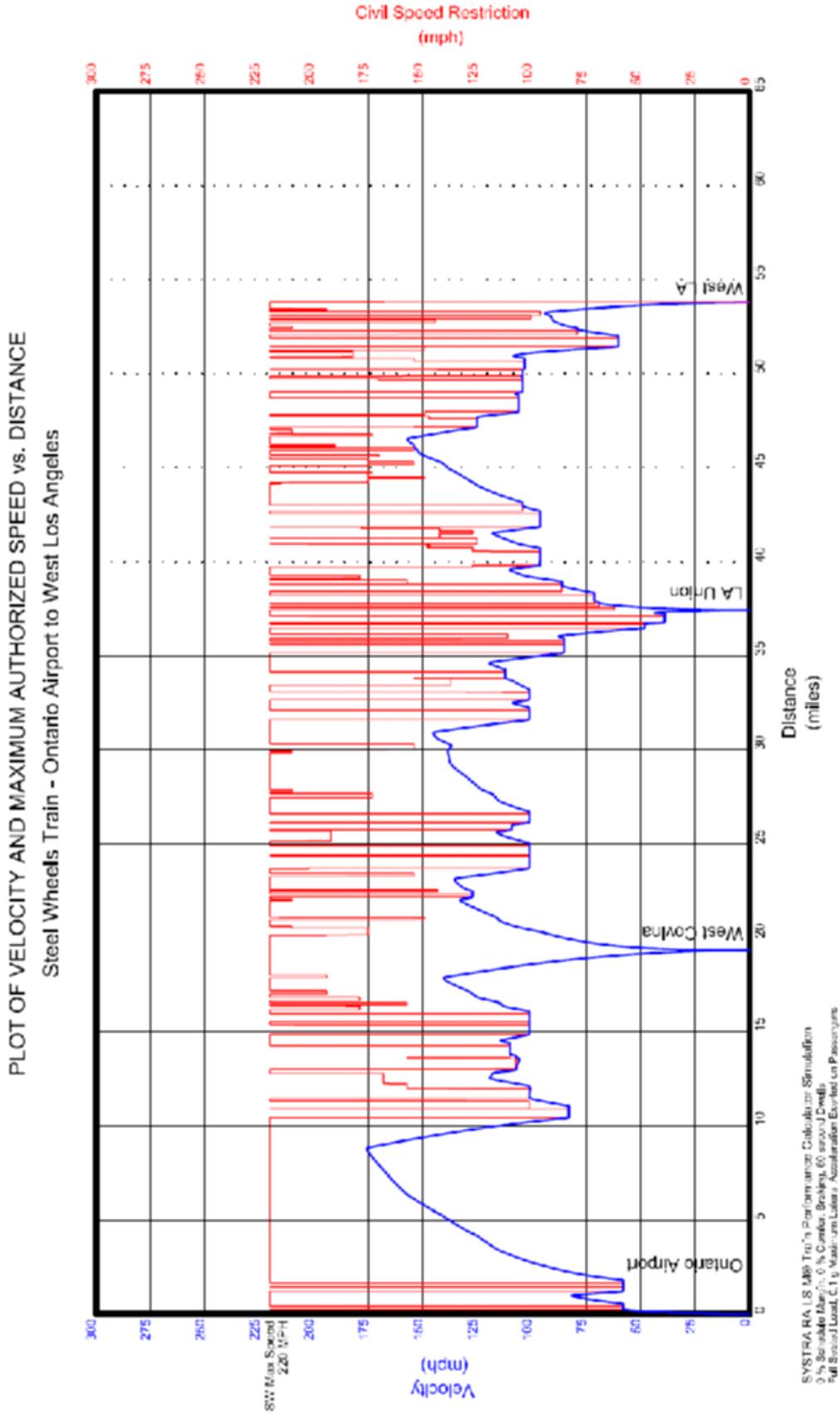


Figure 3.5 Speed Profile, Maglev on UPRR Alignment from LA Union Station to Ontario Airport, Eastbound

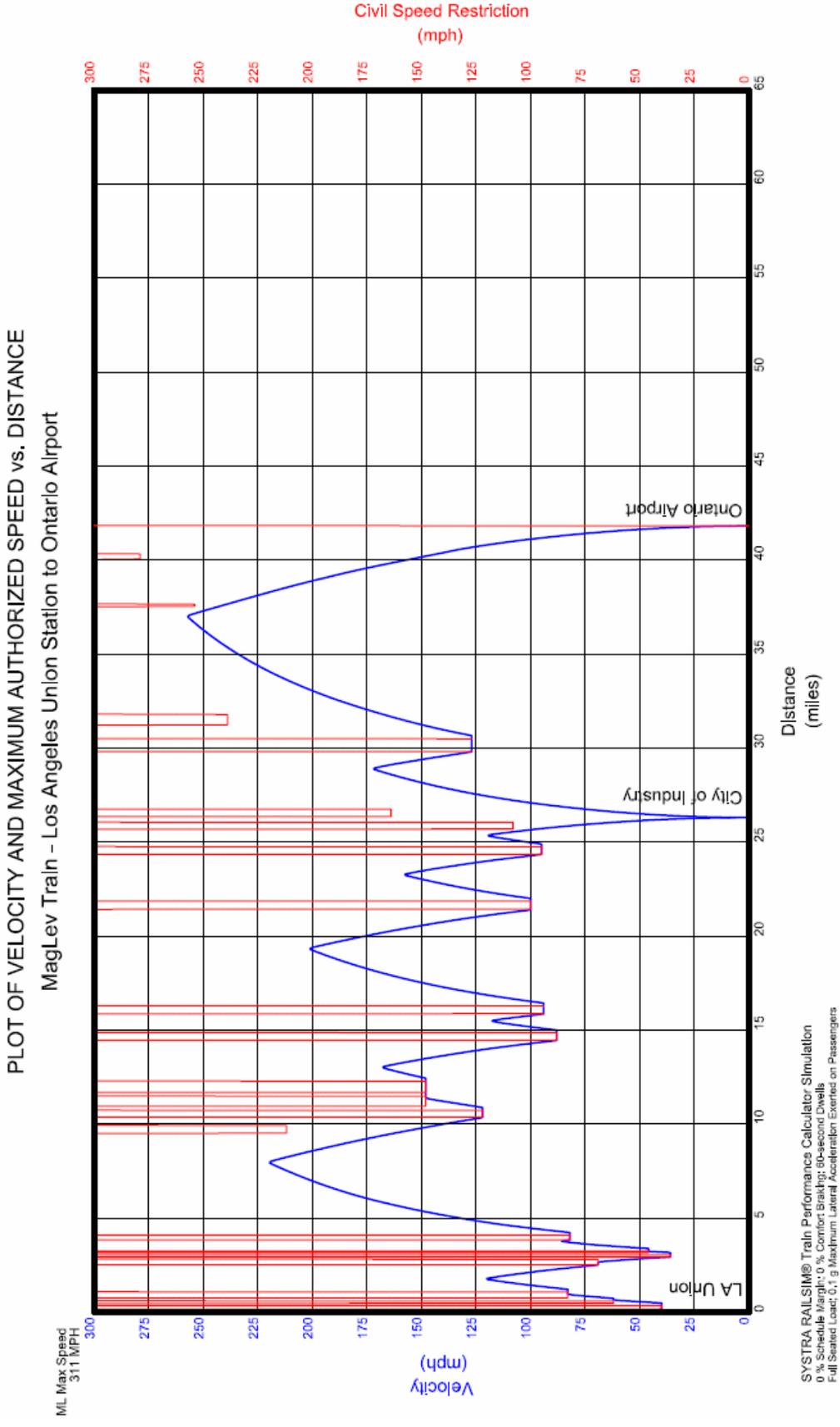


Figure 3.6 Speed Profile, Steel-Wheel on UPRR Alignment from LA Union Station to Ontario Airport, Eastbound  
PLOT OF VELOCITY AND MAXIMUM AUTHORIZED SPEED vs. DISTANCE  
Steel Wheels Train - Los Angeles Union Station to Ontario Airport

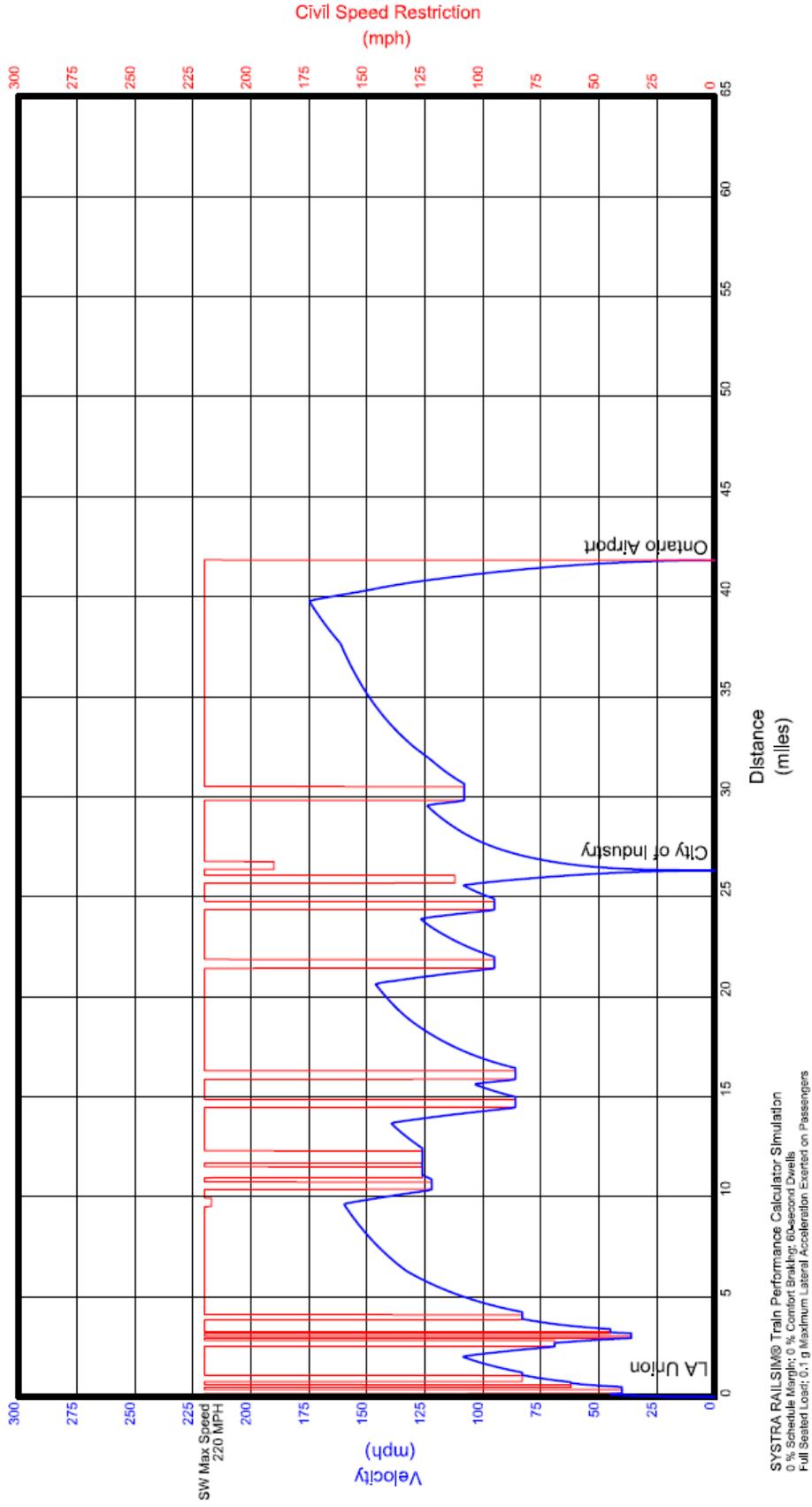


Figure 3.7 Speed Profile, Maglev on UPRR Alignment from Ontario Airport to LA Union Station, Westbound

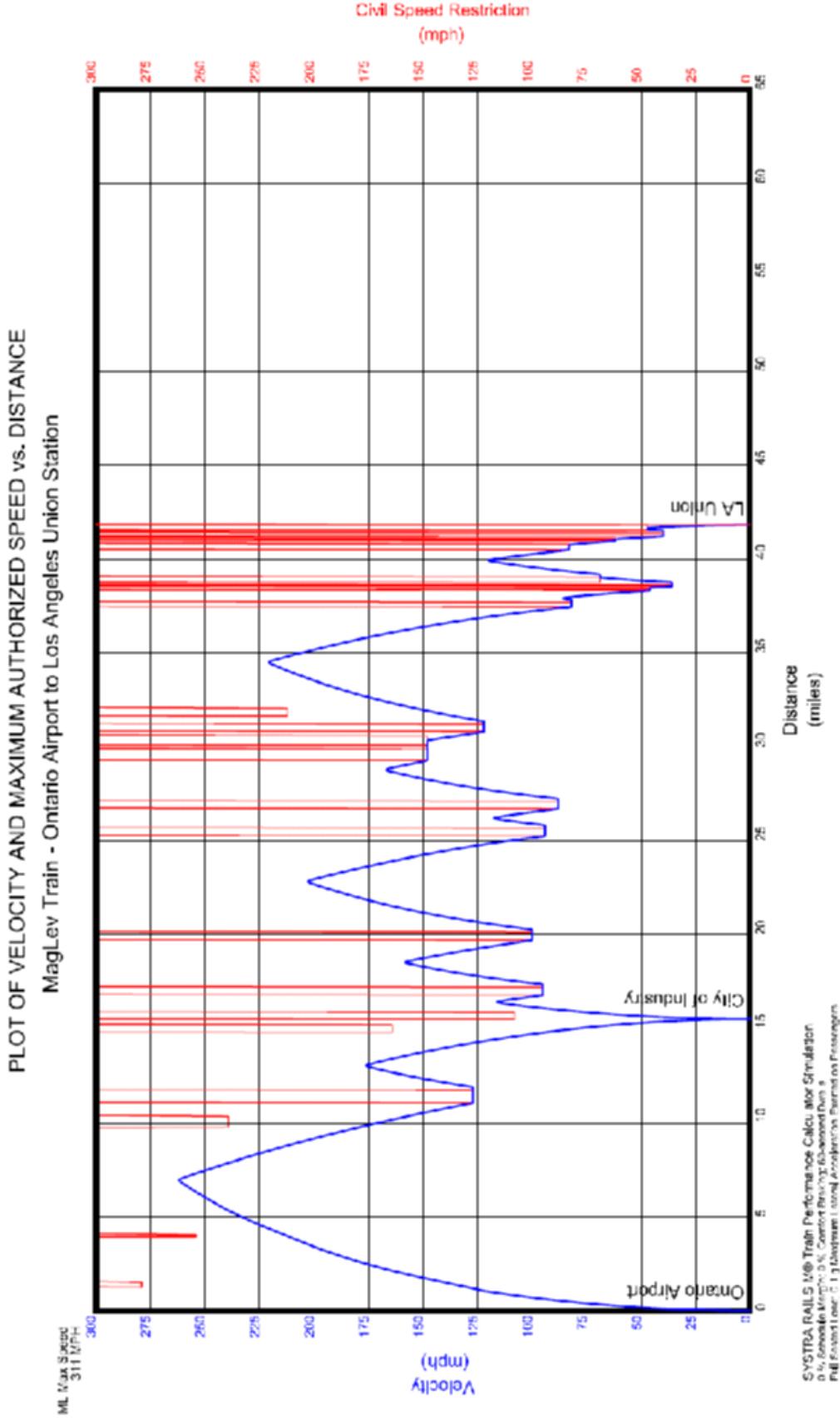
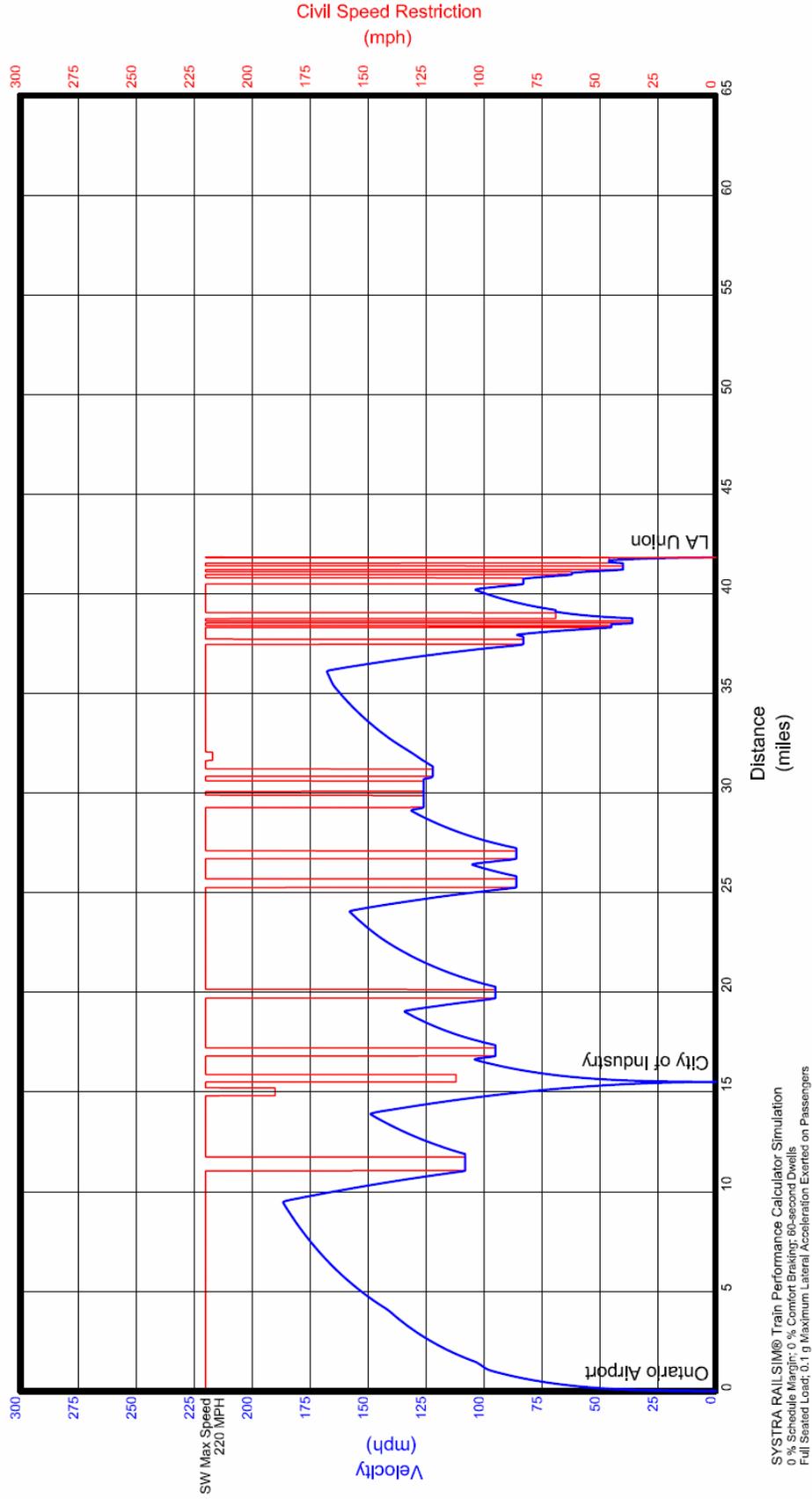


Figure 3.8 Speed Profile, Steel-Wheel on UPRR Alignment from Ontario Airport to LA Union Station, Westbound  
PLOT OF VELOCITY AND MAXIMUM AUTHORIZED SPEED vs. DISTANCE  
Steel Wheels - Ontario Airport to Los Angeles Union Station



SYSTRA RAILSIM® Train Performance Calculator Simulation  
0% Schedule Margin; 0% Comfort Braking; 60-second Dwells  
Full Seated Load; 0.1 g Maximum Lateral Acceleration Exerted on Passengers



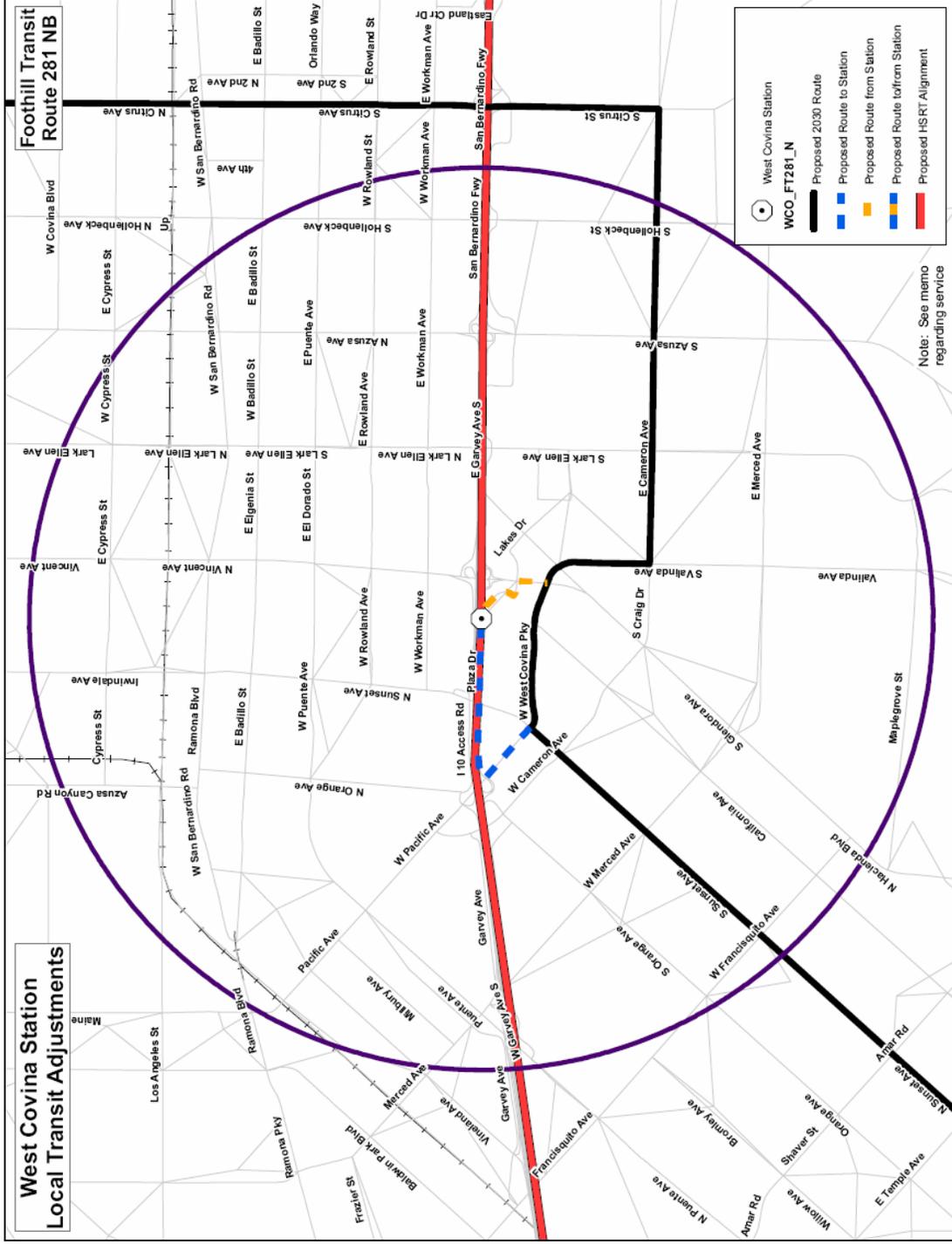
## 4.0 Local Transit Route Adjustments

This appendix shows the reroutings made to local transit services to serve the proposed West Covina, City of Industry, and Ontario Airport HSRT stations.

### 4.1 ADJUSTMENTS TO LOCAL TRANSIT - WEST COVINA

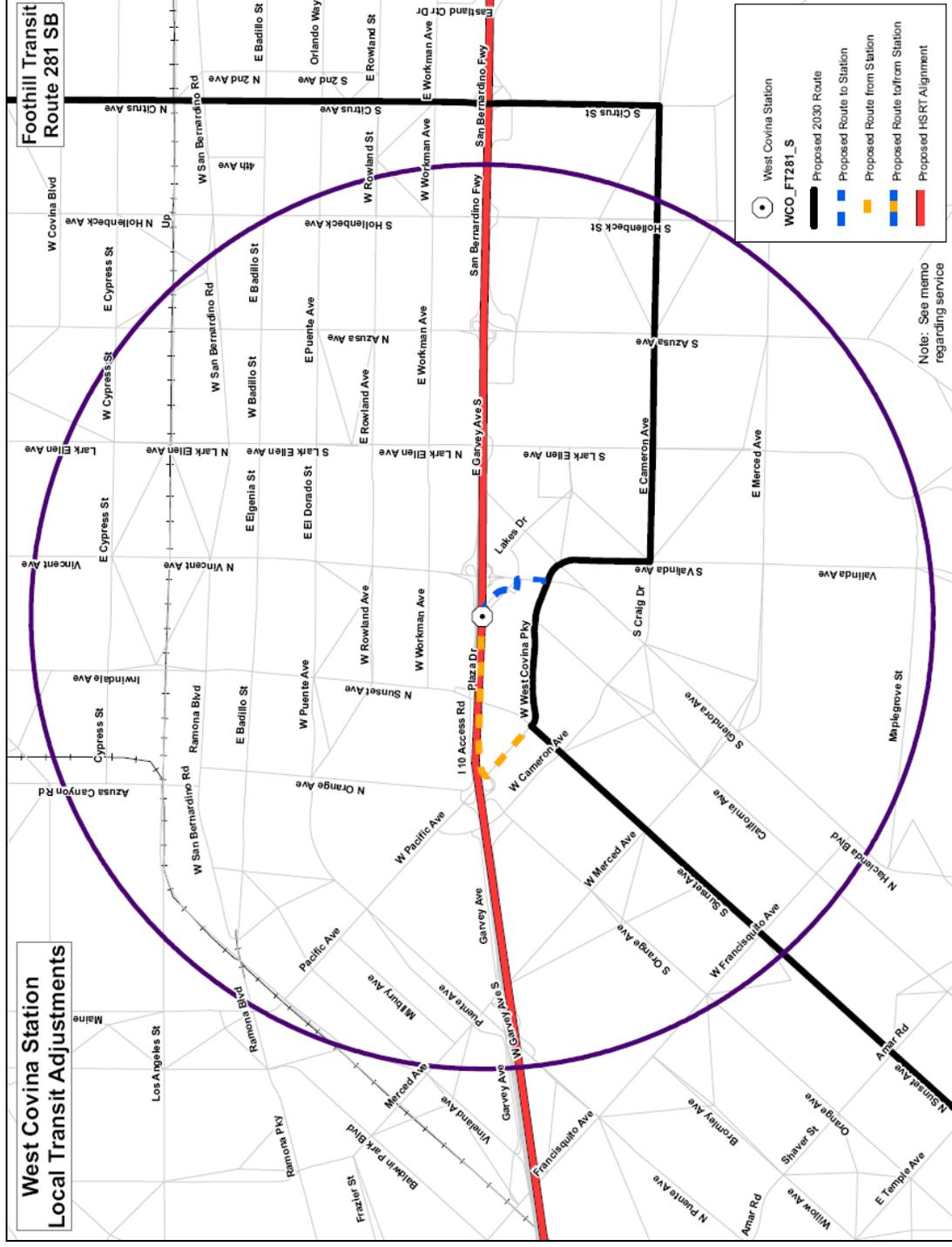
Year 2025 transit routes in the vicinity of the proposed West Covina HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 4.1 to Figure 4.42. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 4.1 Adjustment to Foothill Transit Route 281, Northbound



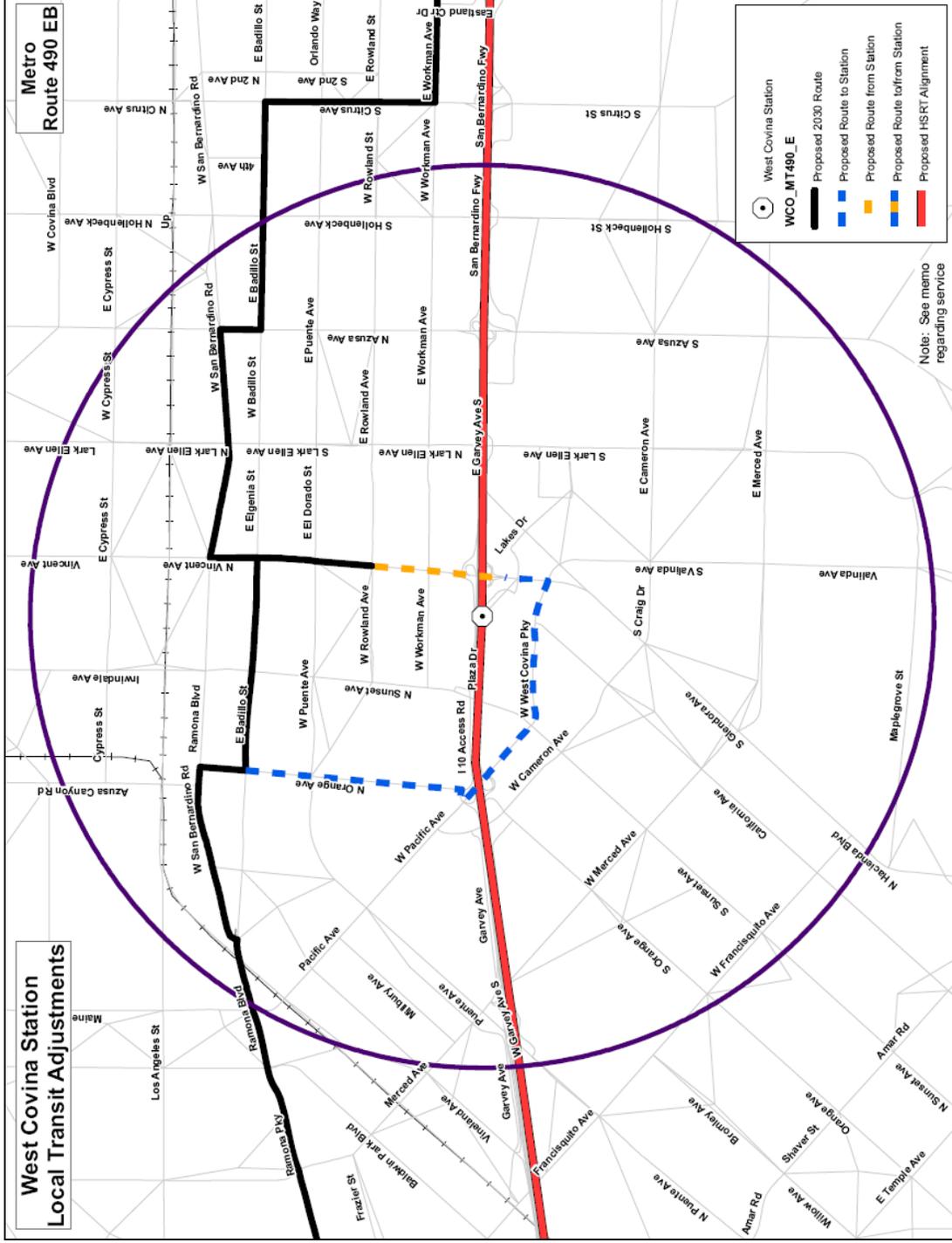
Source: SCAG Regional Travel Demand Model.

Figure 4.2 Adjustment to Foothill Transit Route 281, Southbound



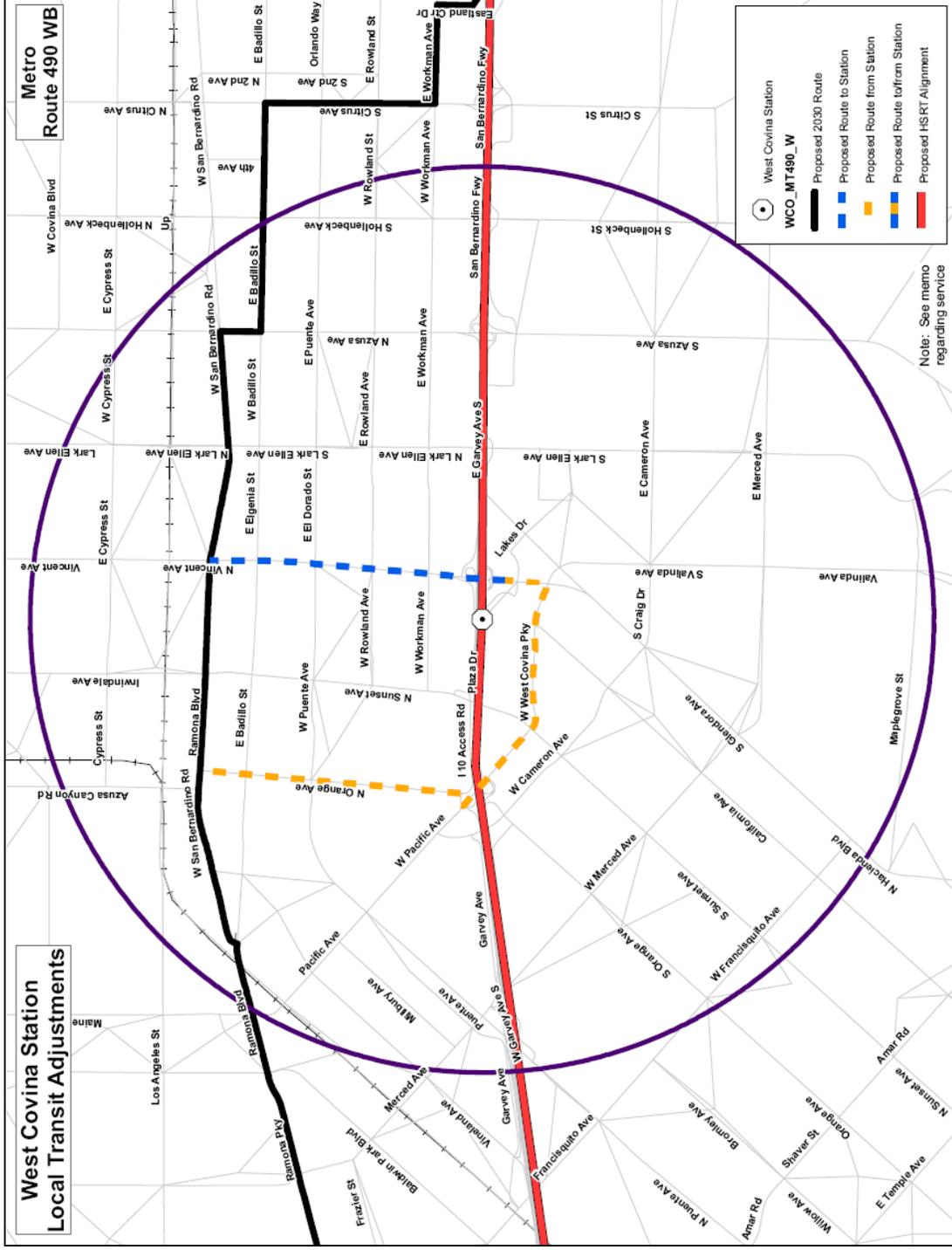
Source: SCAG Regional Travel Demand Model.

Figure 4.3 Adjustment to Metro Route 490, Eastbound



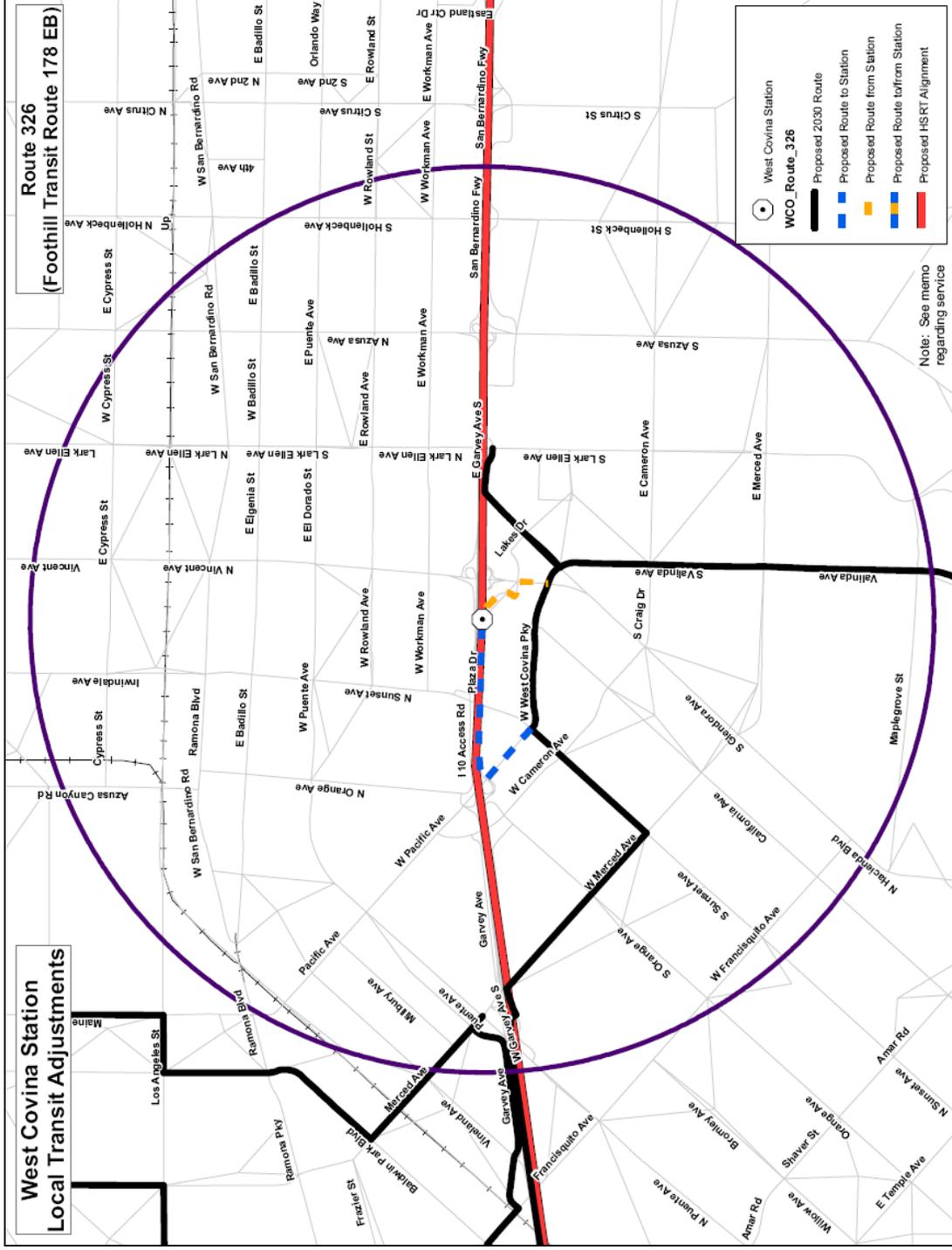
Source: SCAG Regional Travel Demand Model.

Figure 4.4 Adjustment to Metro Route 490, Westbound



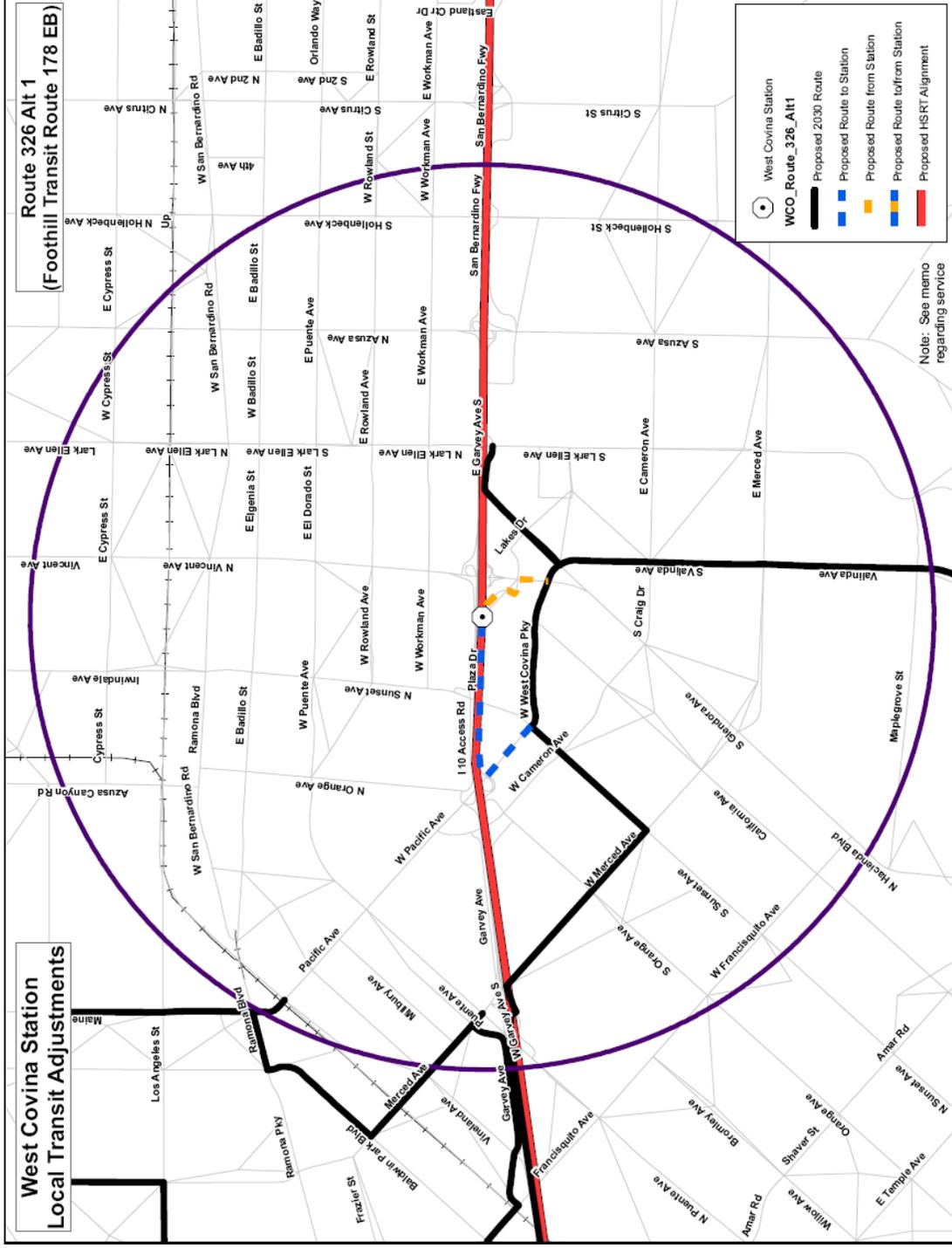
Source: SCAG Regional Travel Demand Model.

Figure 4.5 Adjustment to Foothill Transit Route 178, Eastbound



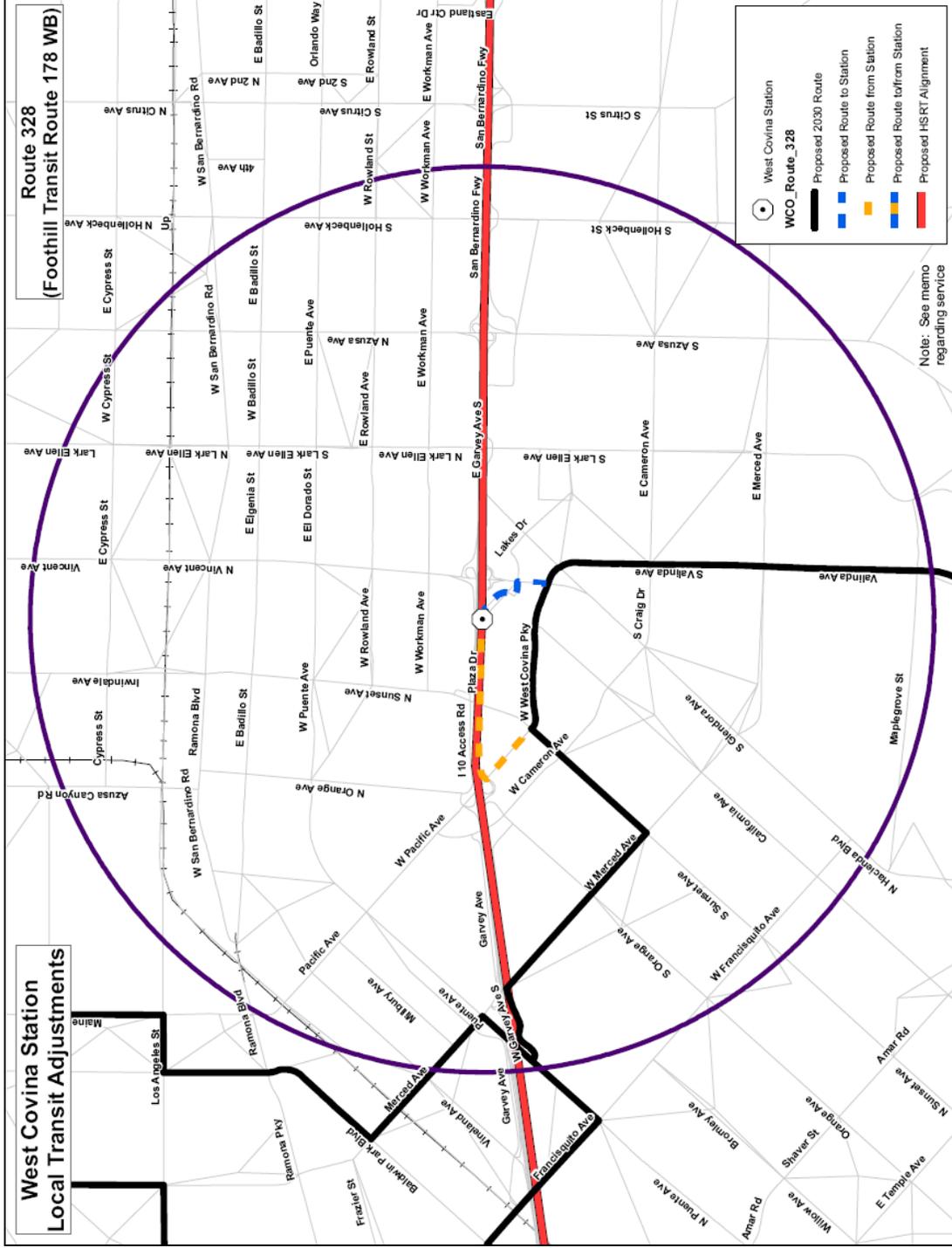
Source: SCAG Regional Travel Demand Model.

Figure 4.6 Adjustment to Foothill Transit Route 178, Eastbound



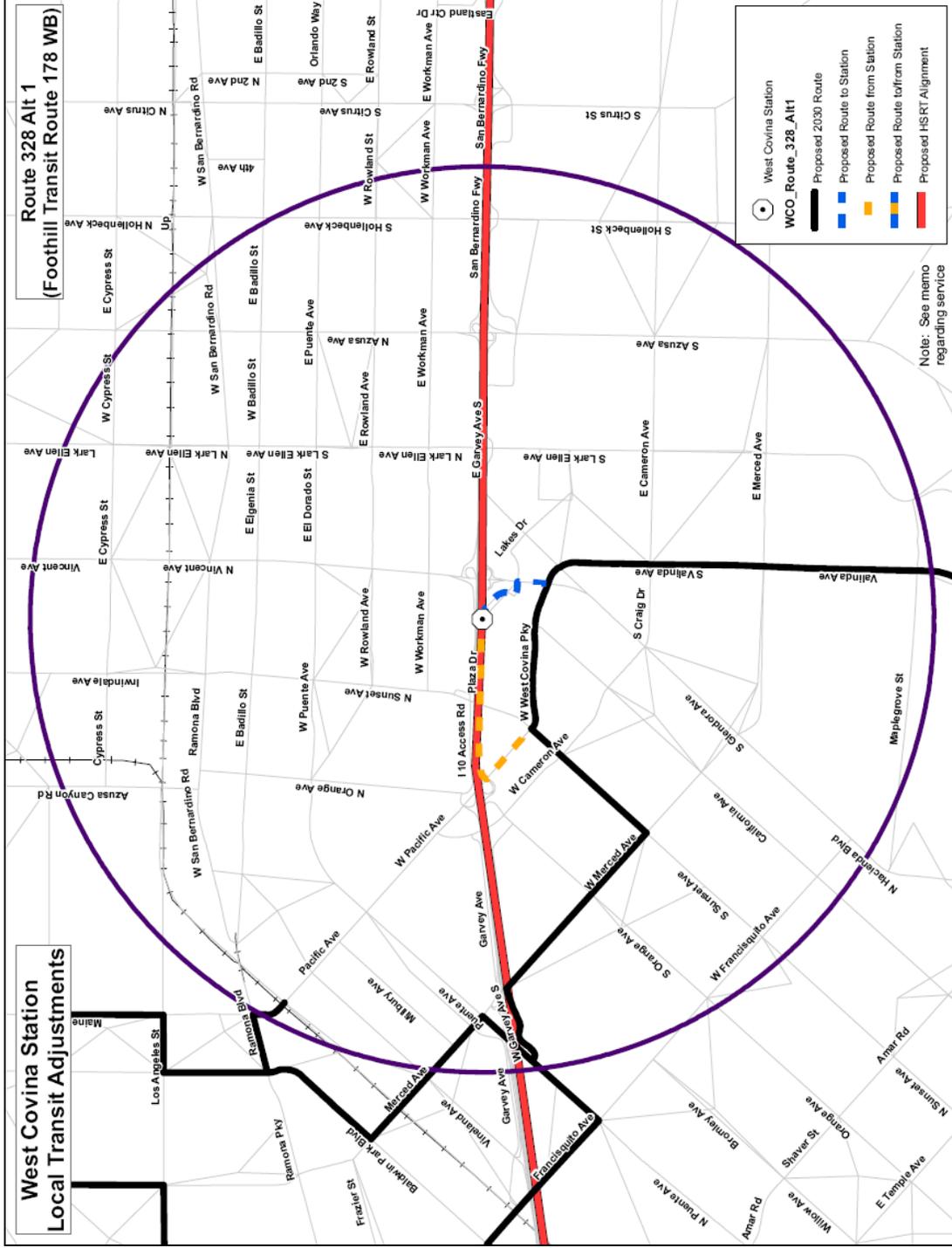
Source: SCAG Regional Travel Demand Model.

Figure 4.7 Adjustment to Foothill Transit Route 178, Westbound



Source: SCAG Regional Travel Demand Model.

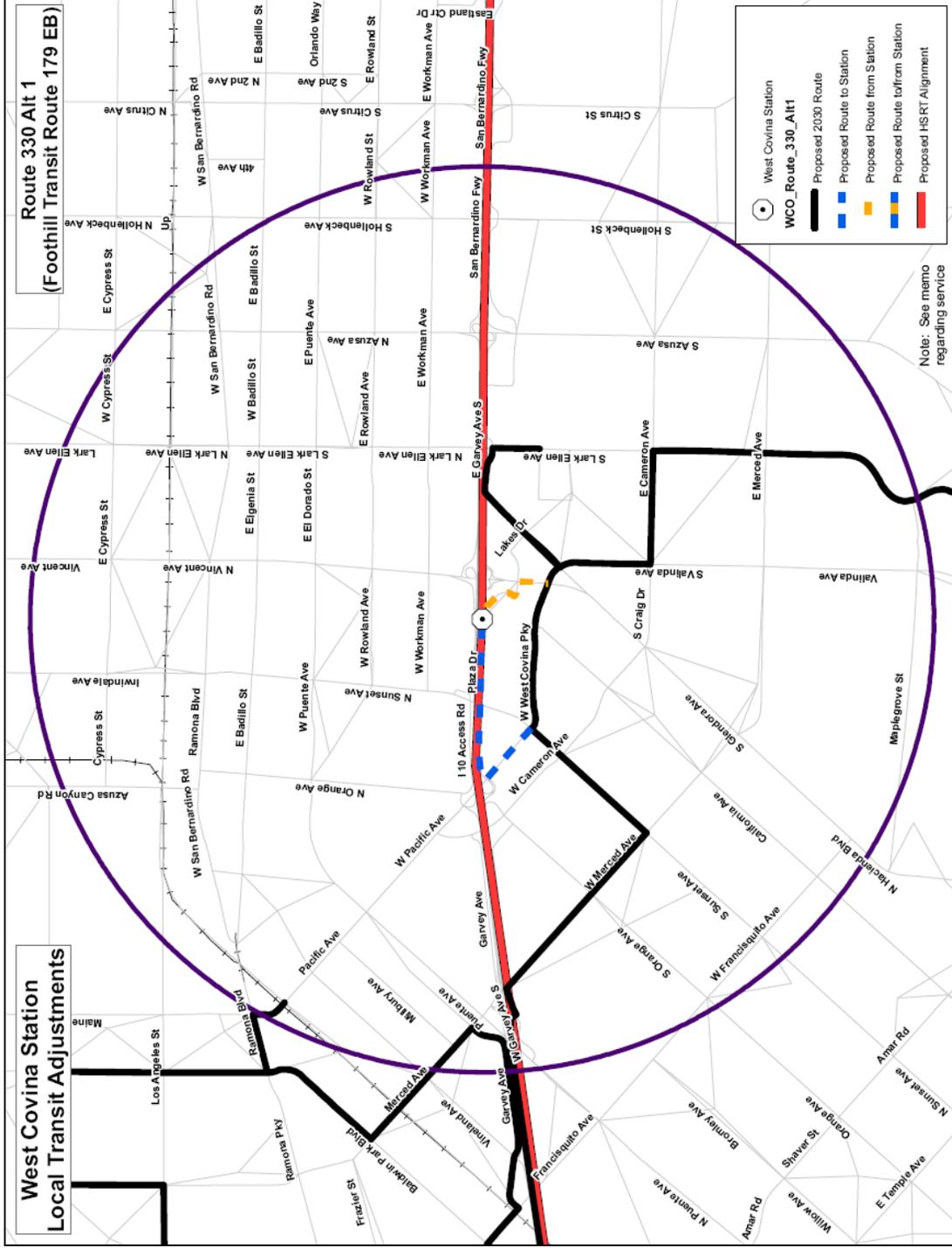
Figure 4.8 Adjustment to Foothill Transit Route 178, Westbound



Source: SCAG Regional Travel Demand Model.

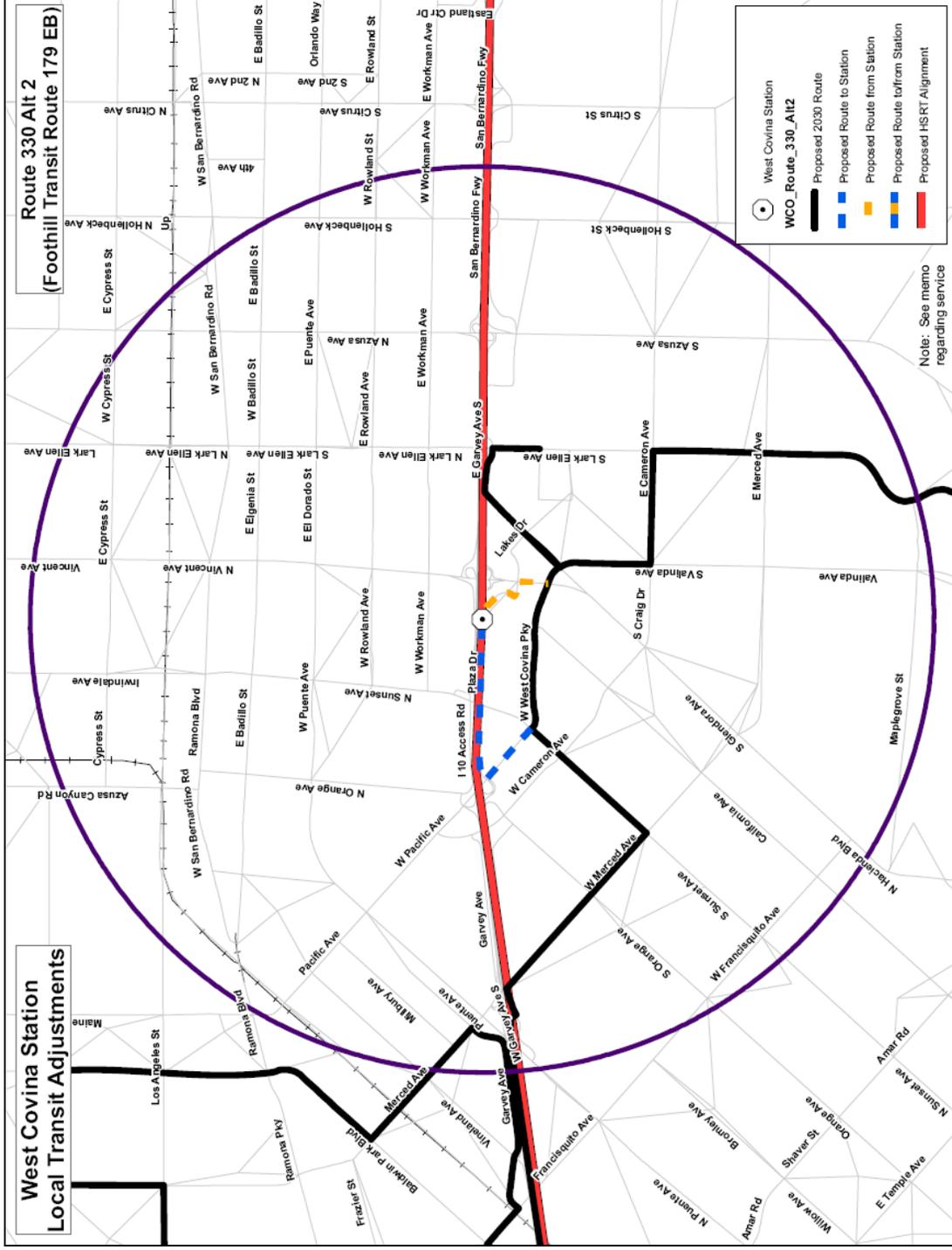


Figure 4.10 Adjustment to Foothill Transit Route 179, Eastbound



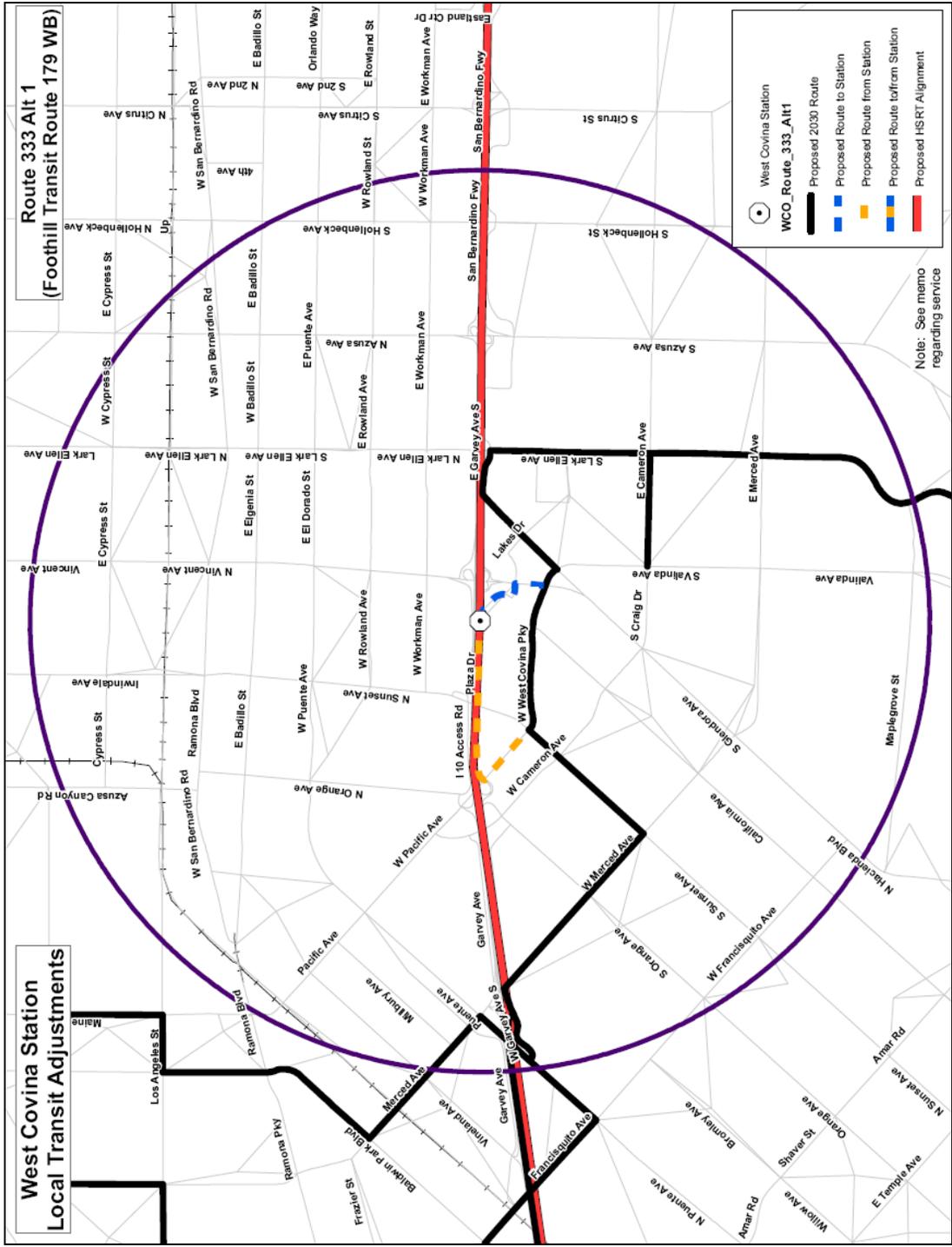
Source: SCAG Regional Travel Demand Model.

Figure 4.11 Adjustment to Foothill Transit Route 179, Eastbound



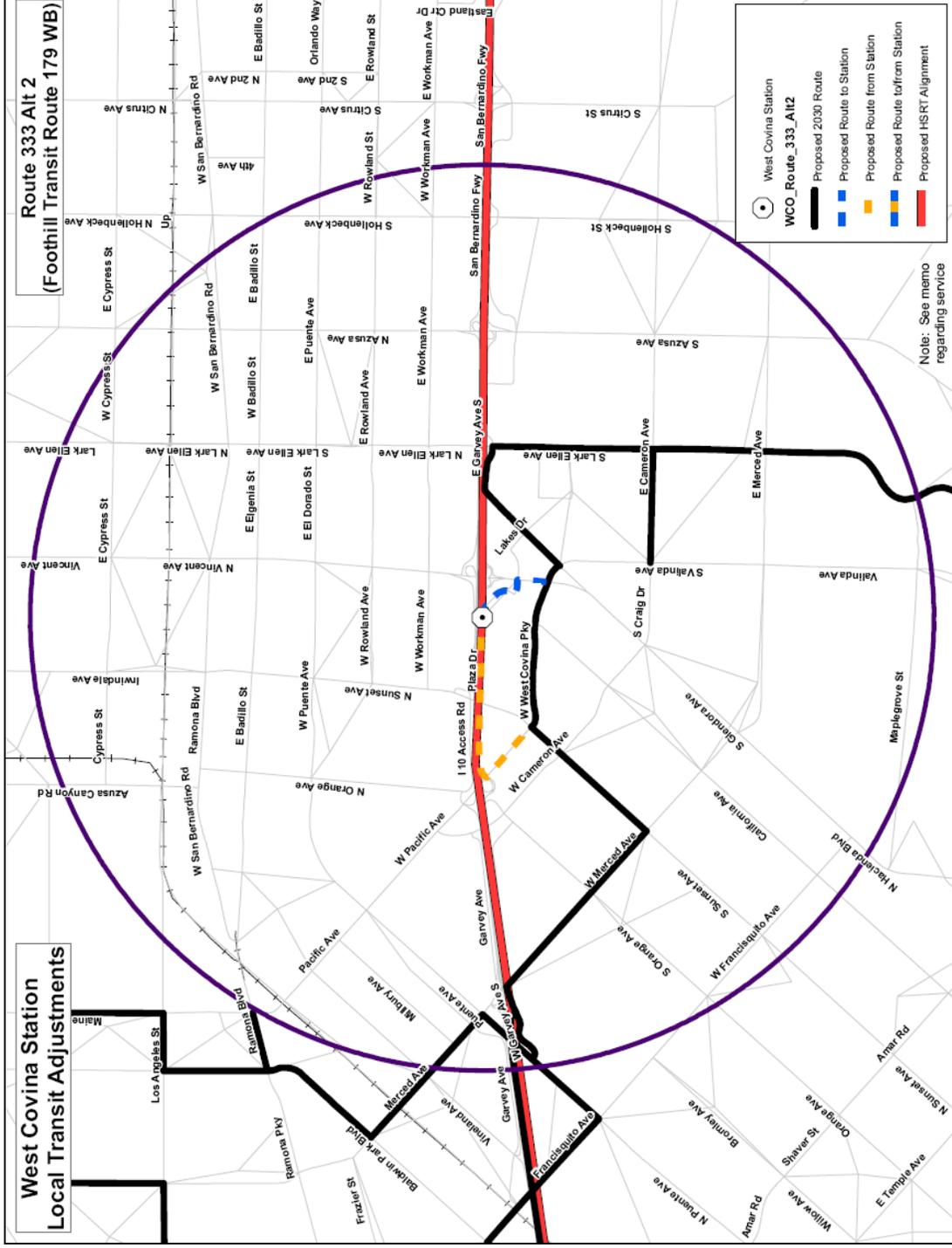
Source: SCAG Regional Travel Demand Model.

Figure 4.12 Adjustment to Foothill Transit Route 179, Westbound



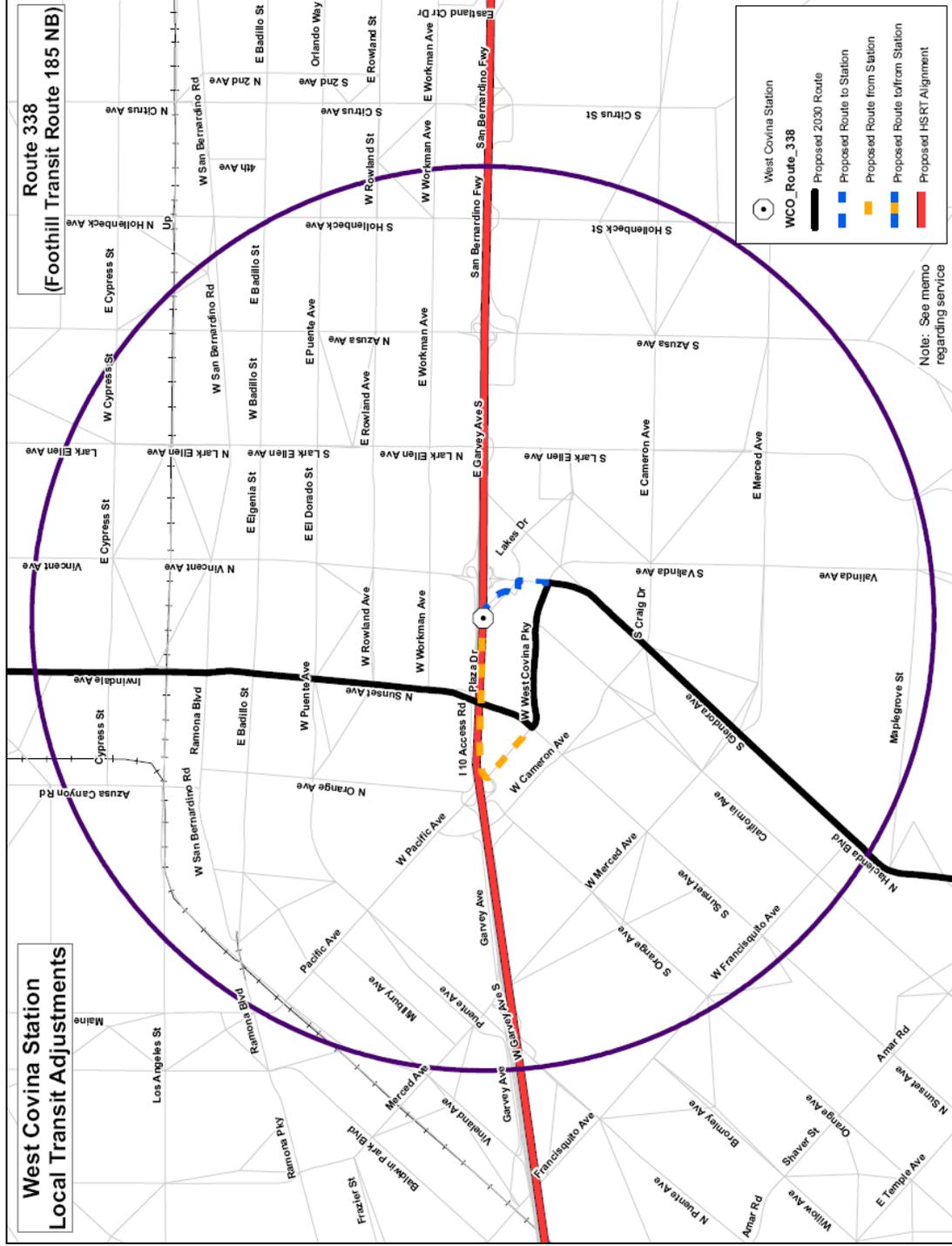
Source: SCAG Regional Travel Demand Model.

Figure 4.13 Adjustment to Foothill Transit Route 179, Westbound



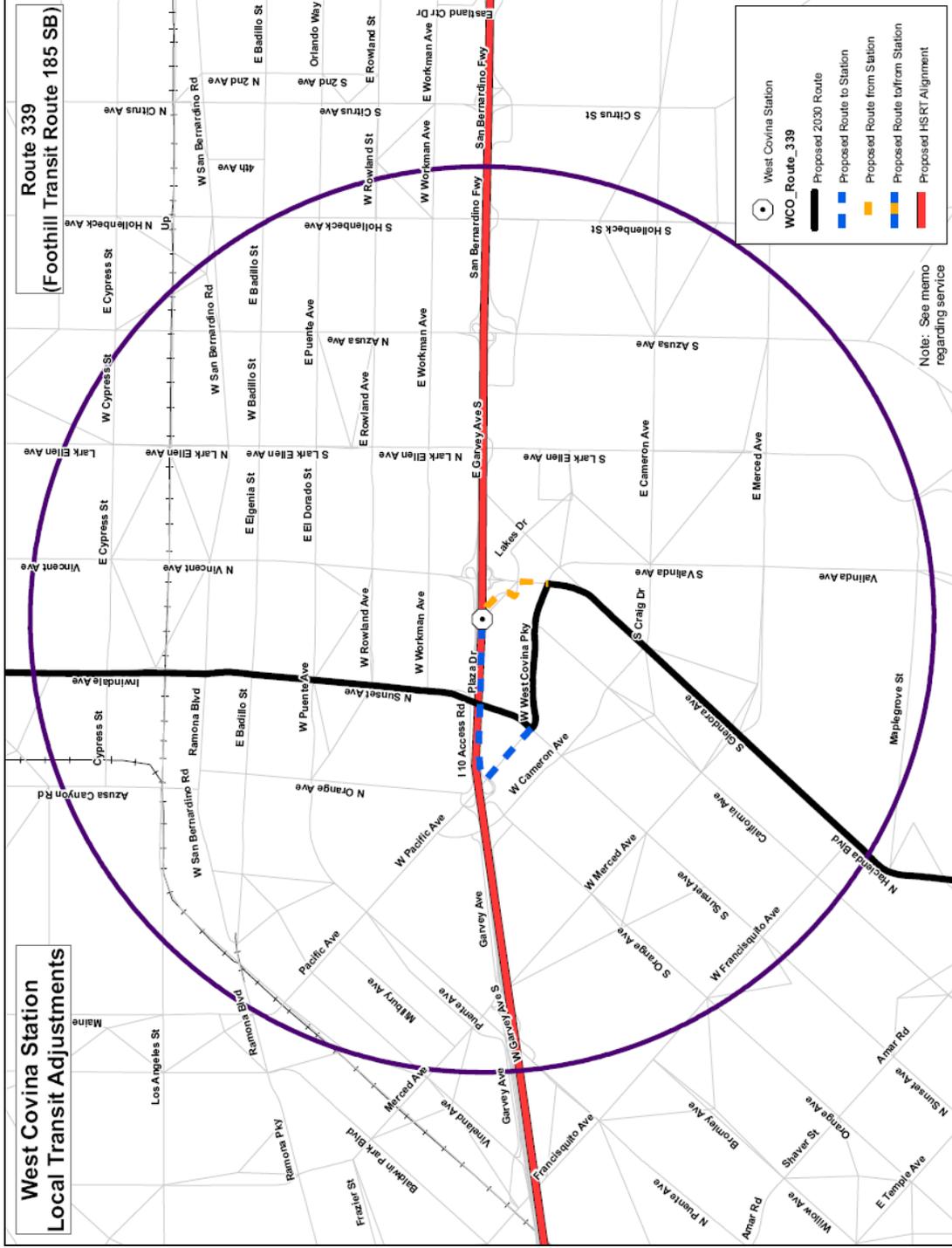
Source: SCAG Regional Travel Demand Model.

Figure 4.14 Adjustment to Foothill Transit Route 185, Northbound



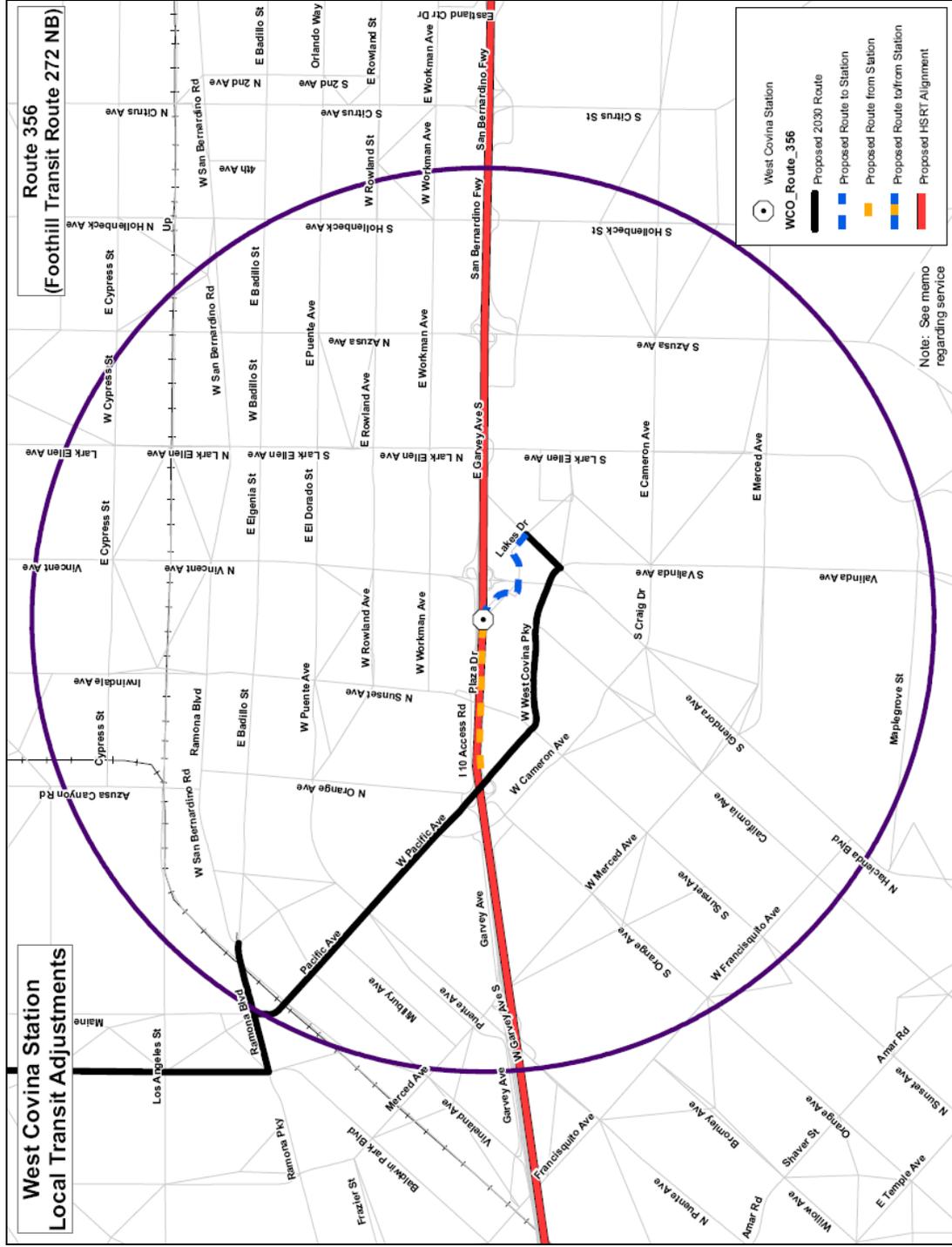
Source: SCAG Regional Travel Demand Model.

Figure 4.15 Adjustment to Foothill Transit Route 185, Southbound



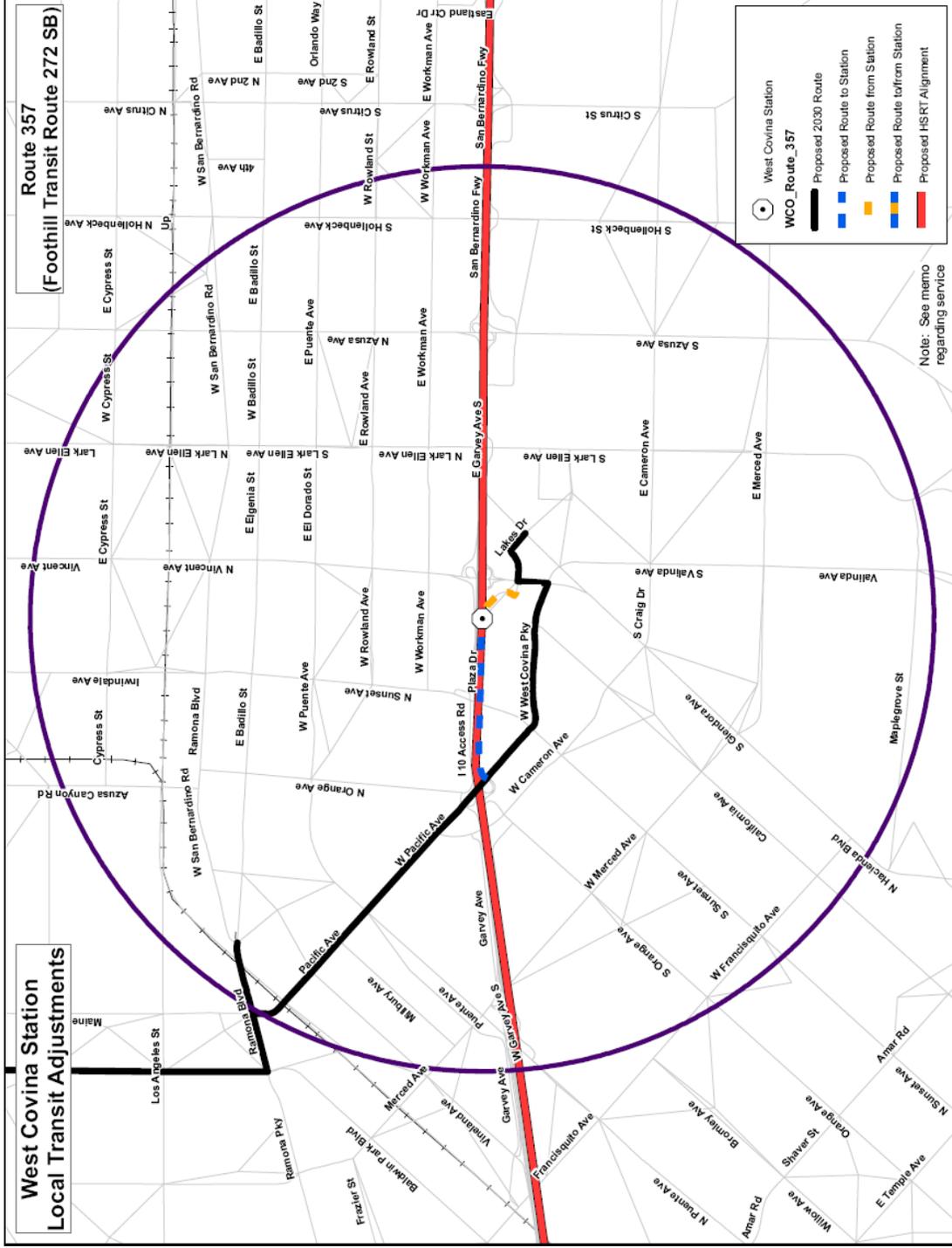
Source: SCAG Regional Travel Demand Model.

Figure 4.16 Adjustment to Foothill Transit Route 272, Northbound



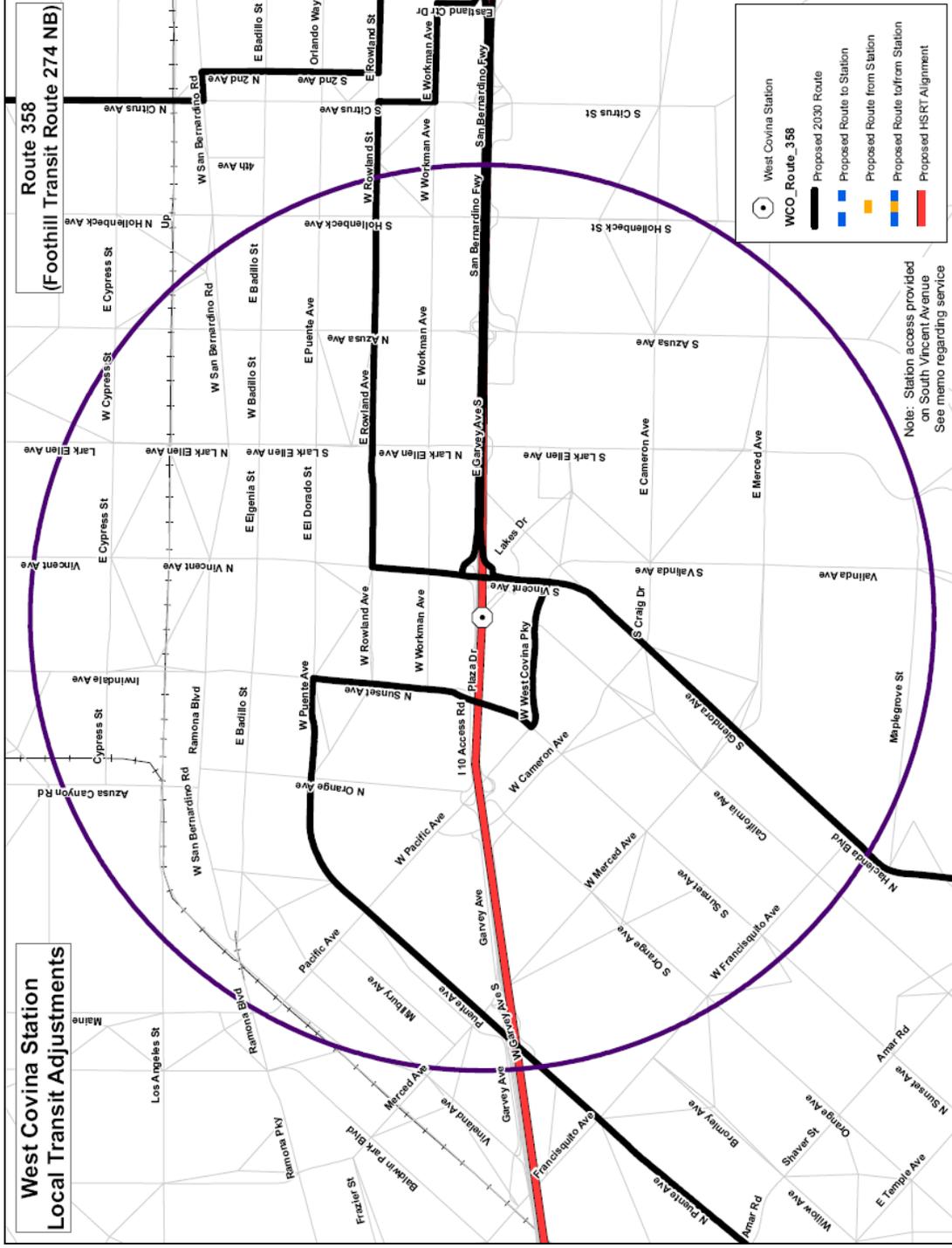
Source: SCAG Regional Travel Demand Model.

Figure 4.17 Adjustment to Foothill Transit Route 272, Southbound



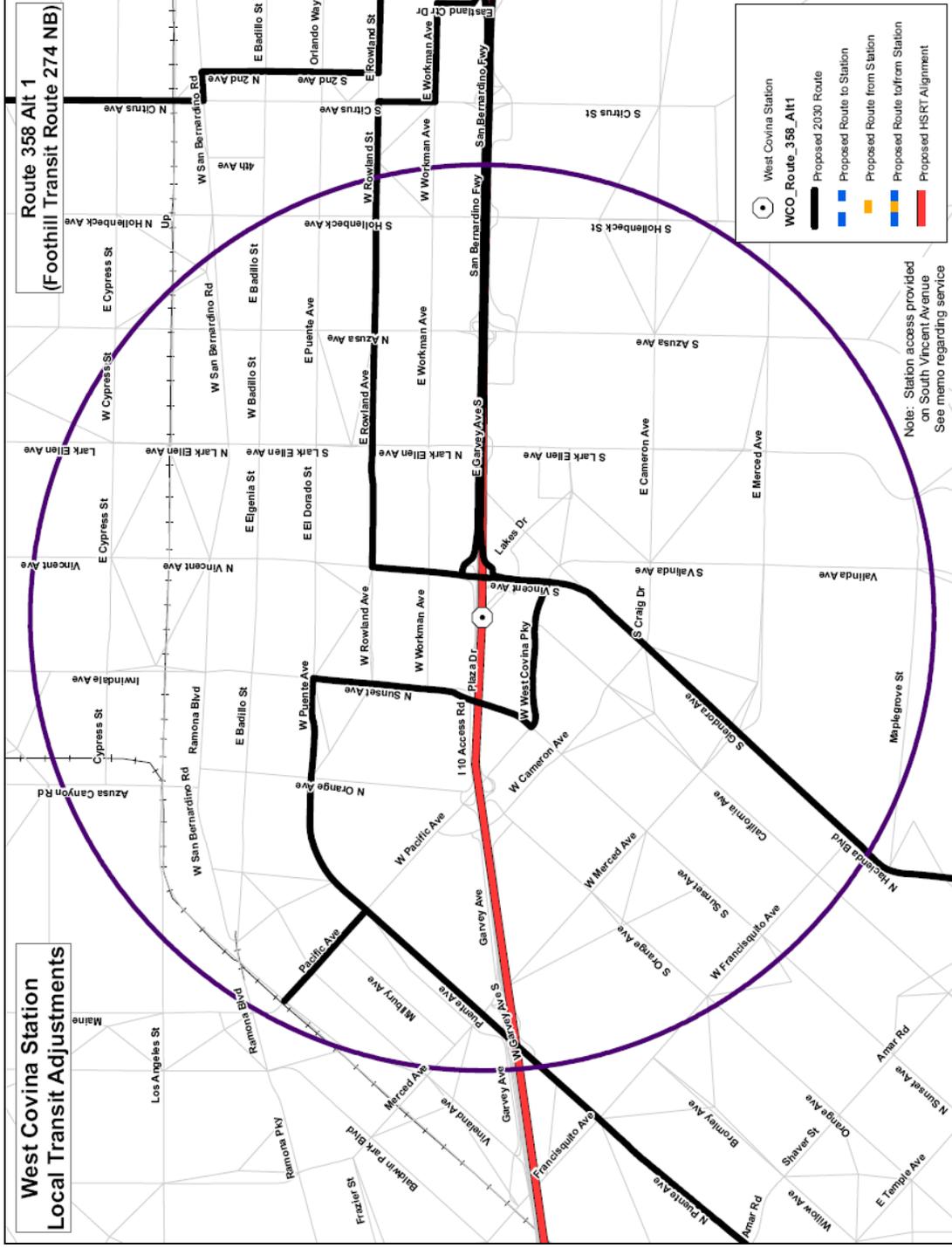
Source: SCAG Regional Travel Demand Model.

Figure 4.18 Adjustment to Foothill Transit Route 274, Northbound



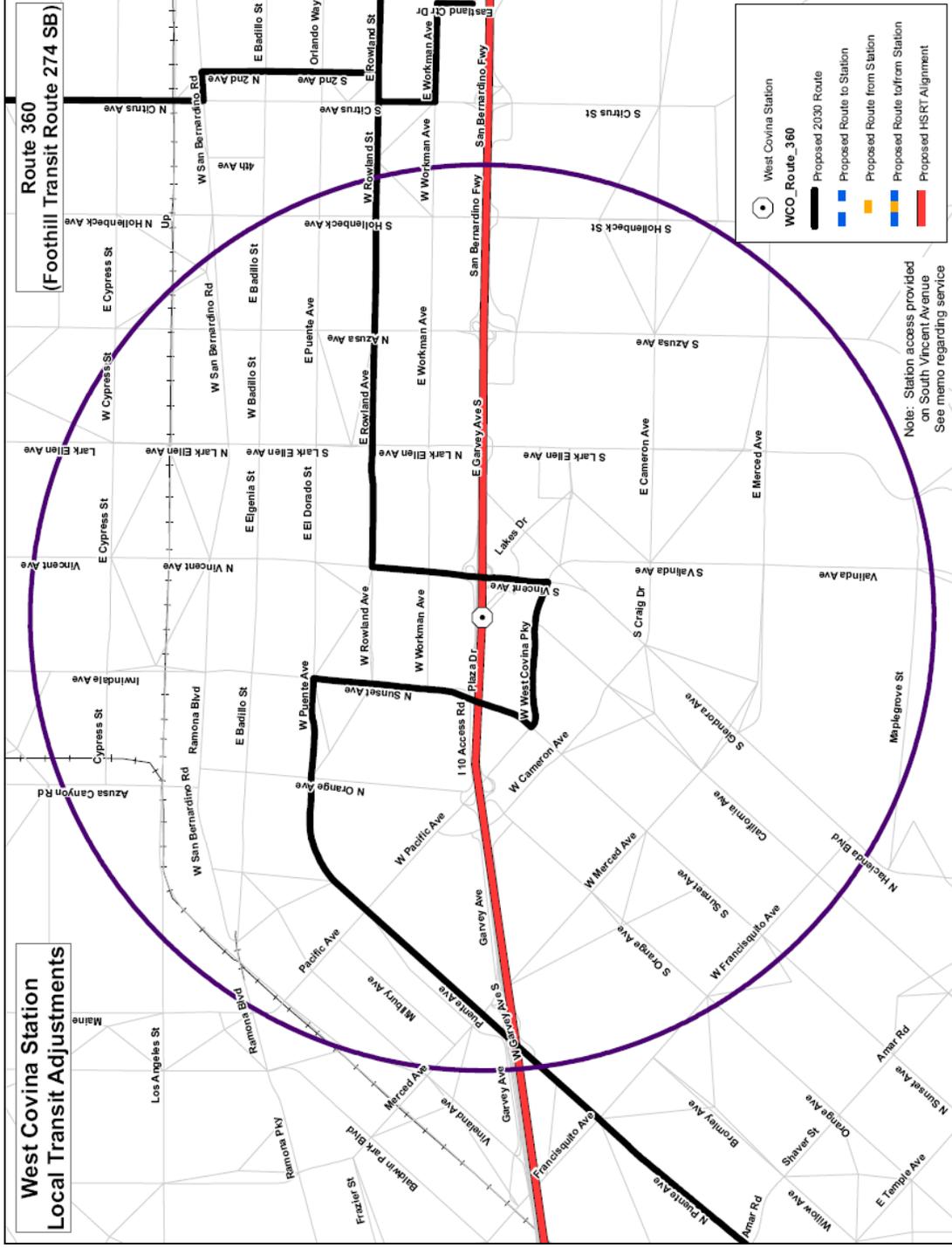
Source: SCAG Regional Travel Demand Model.

Figure 4.19 Adjustment to Foothill Transit Route 274, Northbound



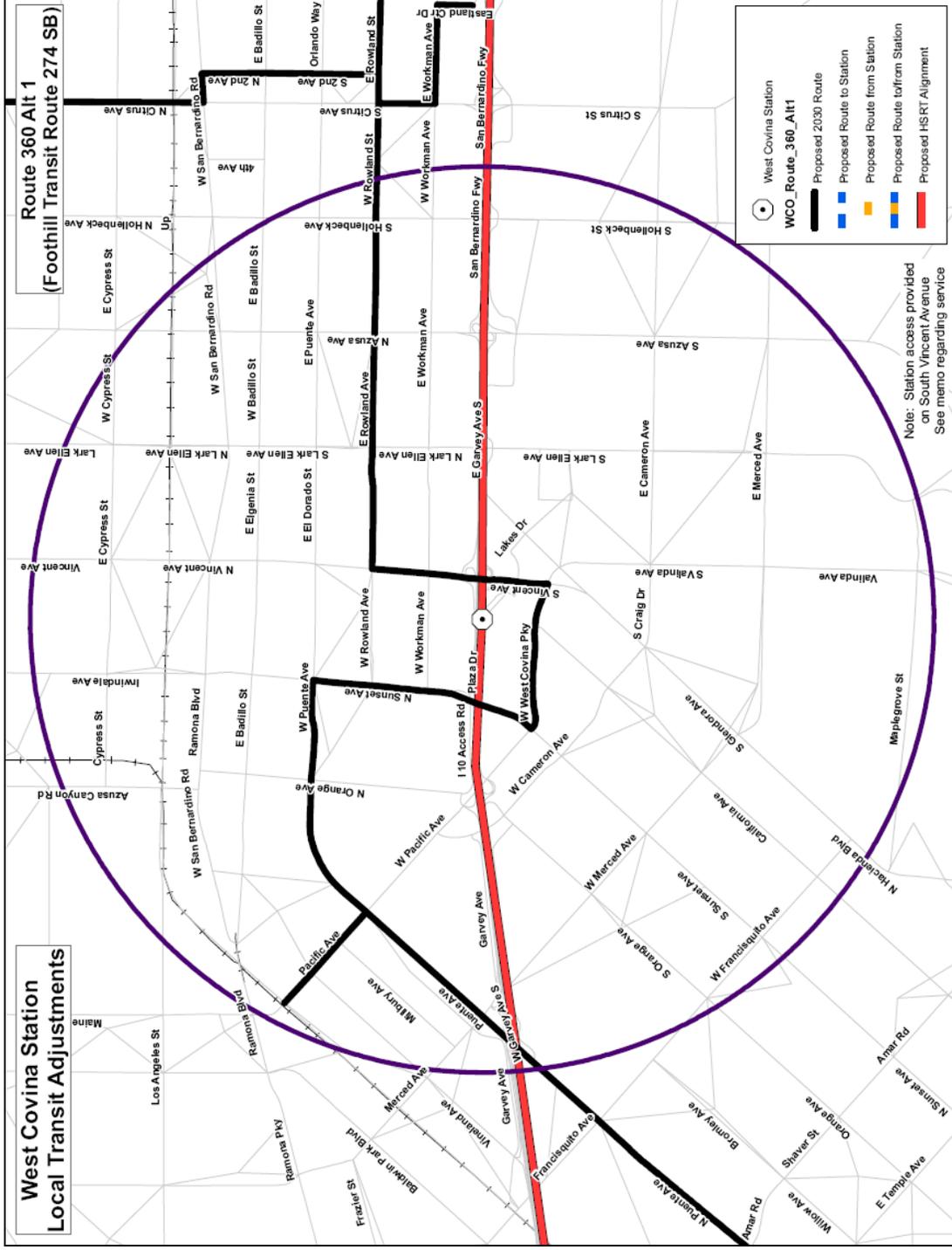
Source: SCAG Regional Travel Demand Model.

Figure 4.20 Adjustment to Foothill Transit Route 274, Southbound



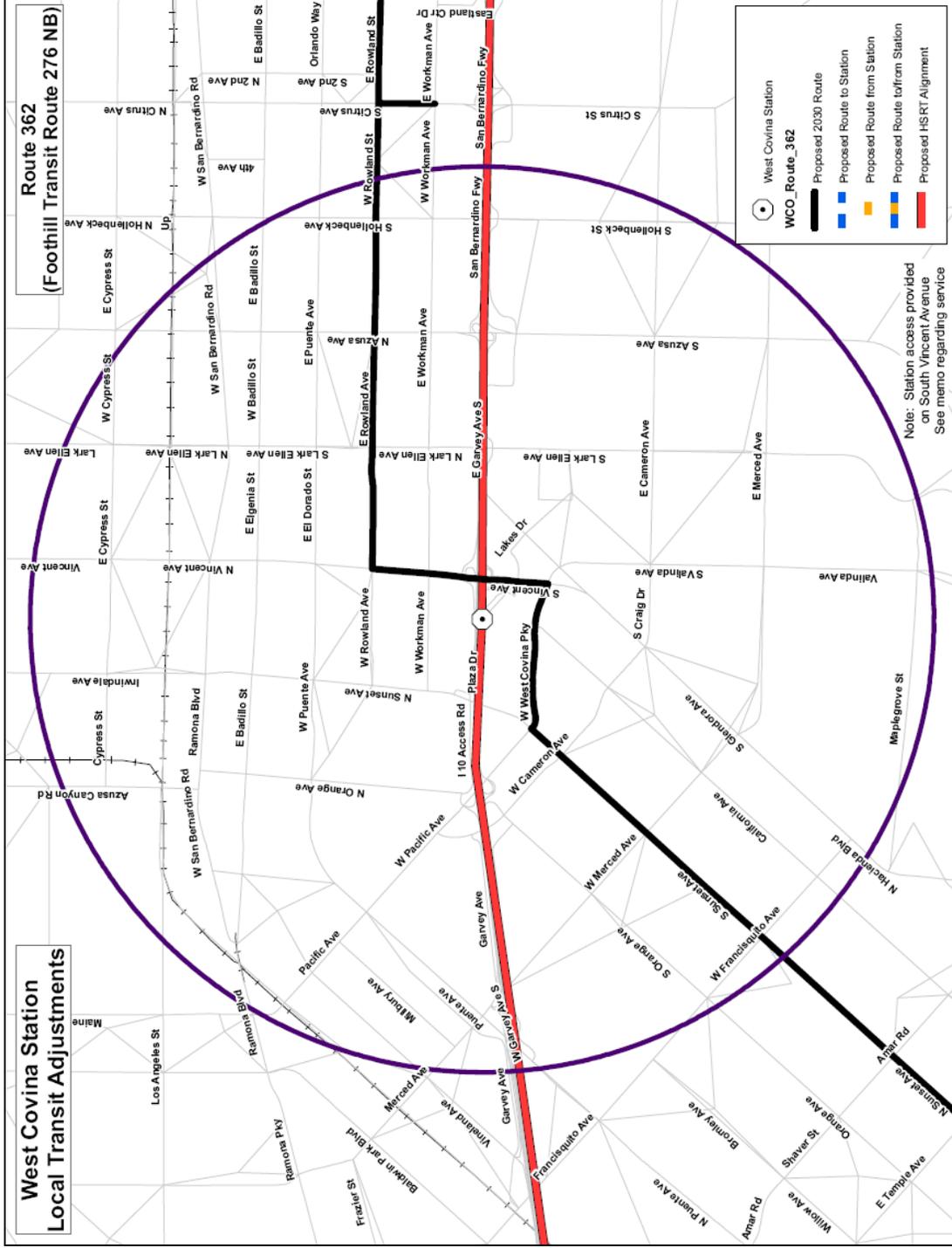
Source: SCAG Regional Travel Demand Model.

Figure 4.21 Adjustment to Foothill Transit Route 274, Southbound



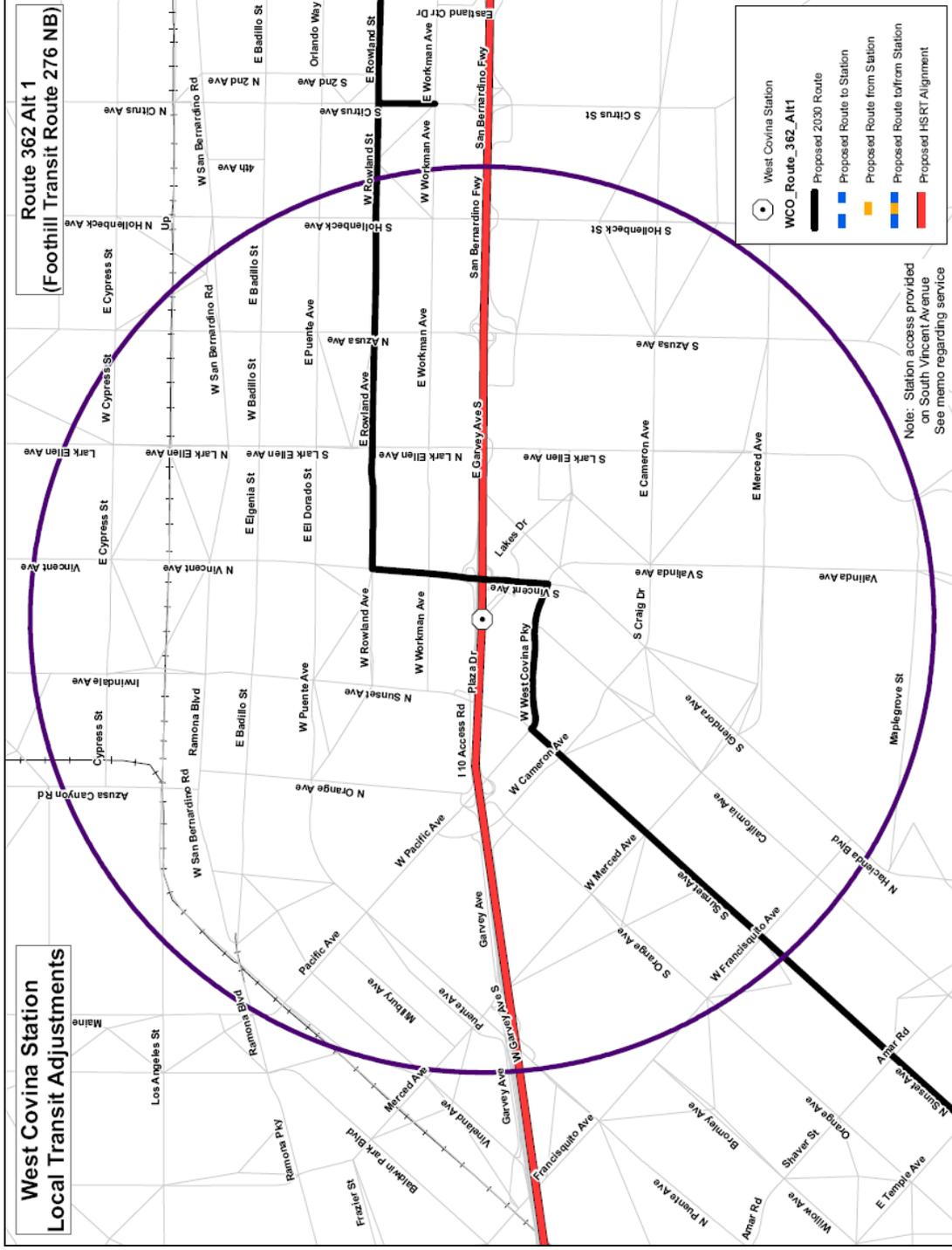
Source: SCAG Regional Travel Demand Model.

Figure 4.22 Adjustment to Foothill Transit Route 276, Northbound



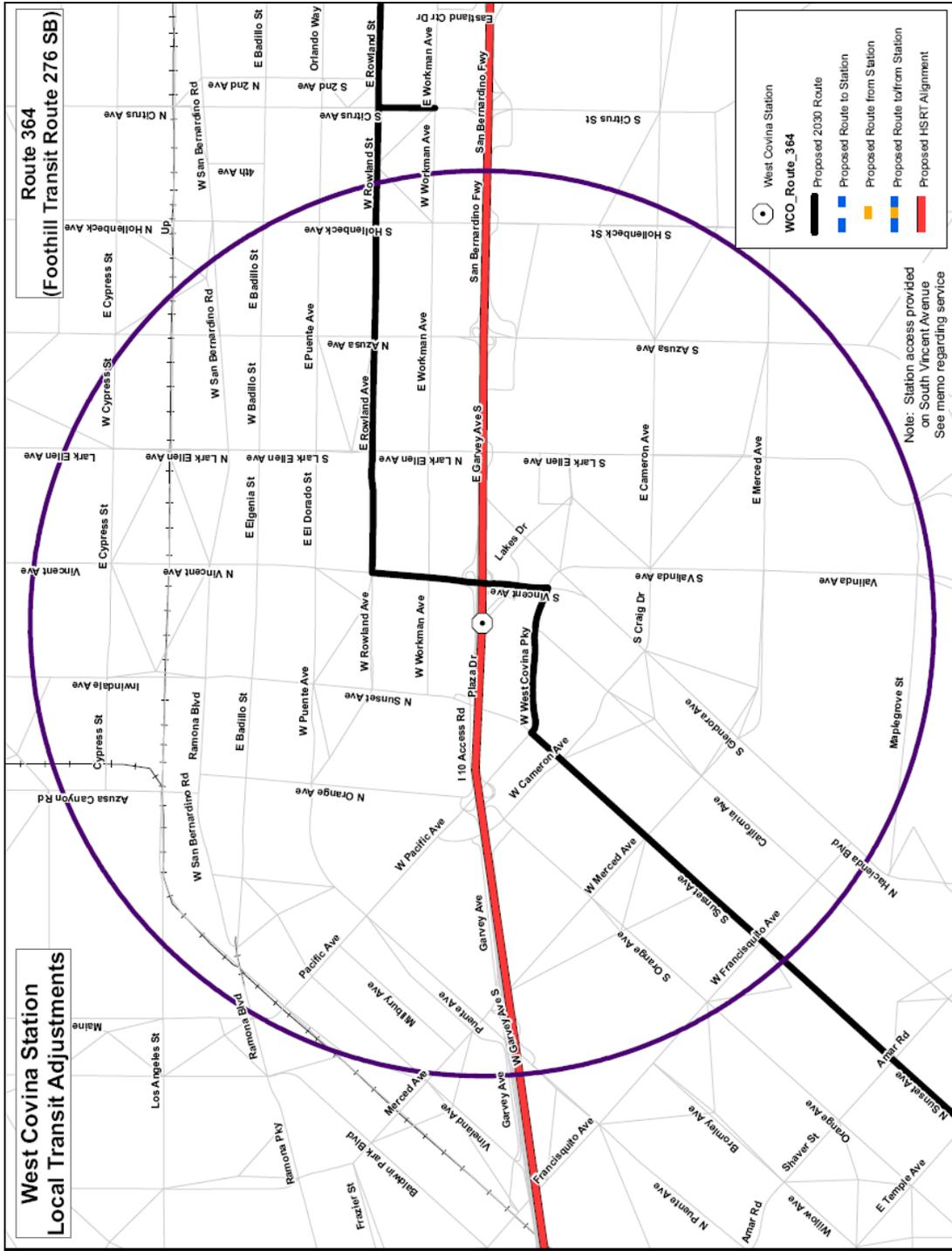
Source: SCAG Regional Travel Demand Model.

Figure 4.23 Adjustment to Foothill Transit Route 276, Northbound



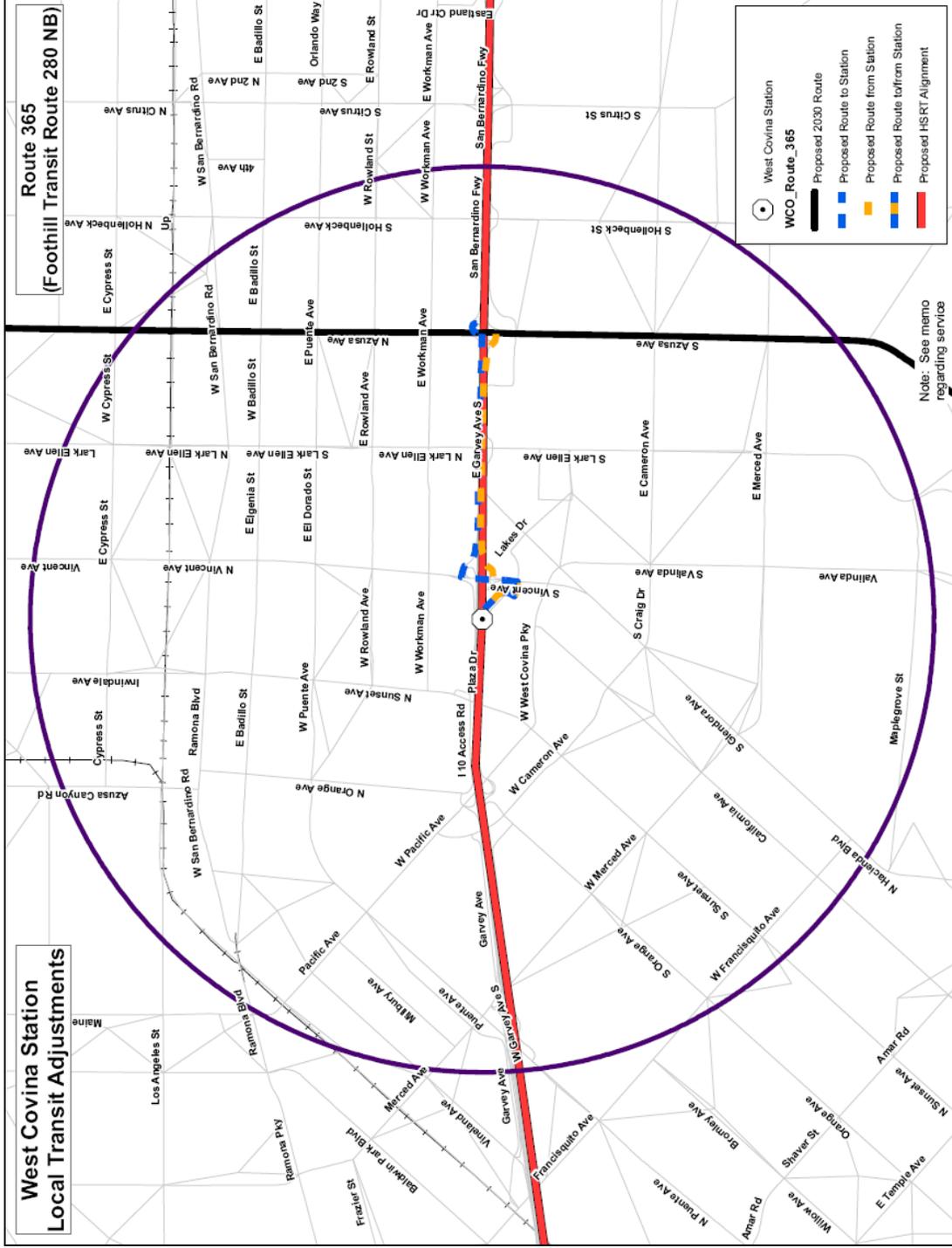
Source: SCAG Regional Travel Demand Model.

Figure 4.24 Adjustment to Foothill Transit Route 276, Southbound



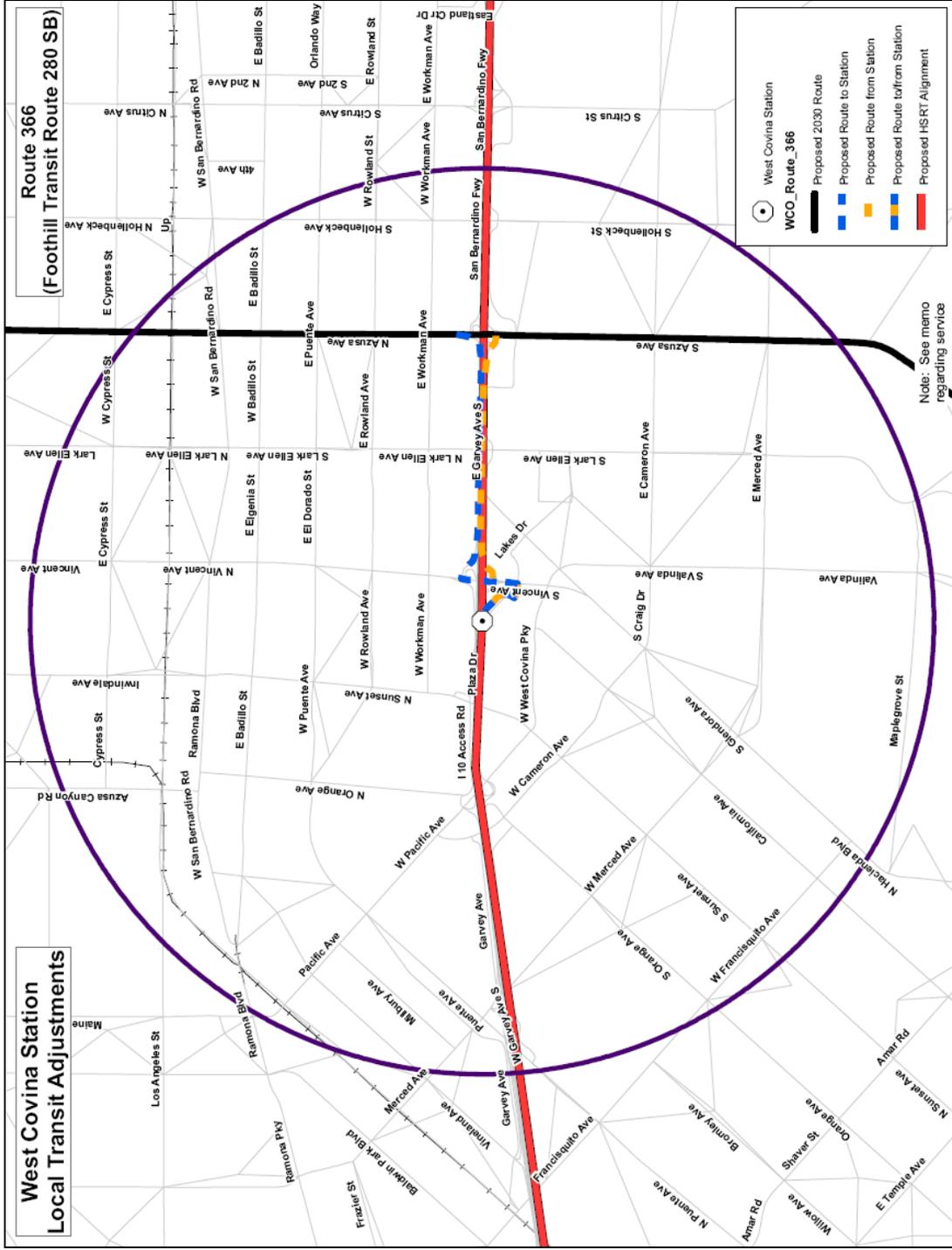
Source: SCAG Regional Travel Demand Model.

Figure 4.25 Adjustment to Foothill Transit Route 280, Northbound



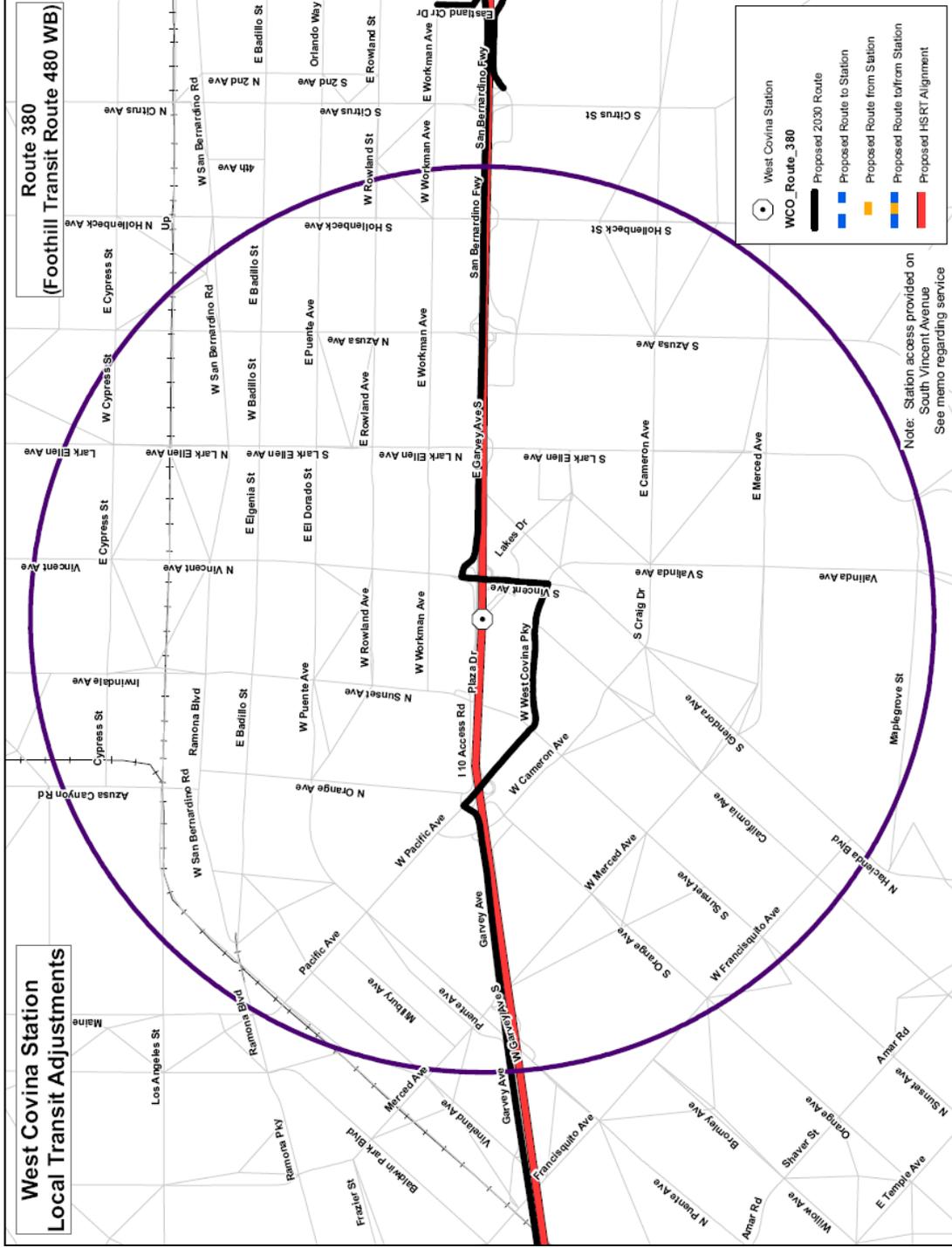
Source: SCAG Regional Travel Demand Model.

Figure 4.26 Adjustment to Foothill Transit Route 280, Southbound



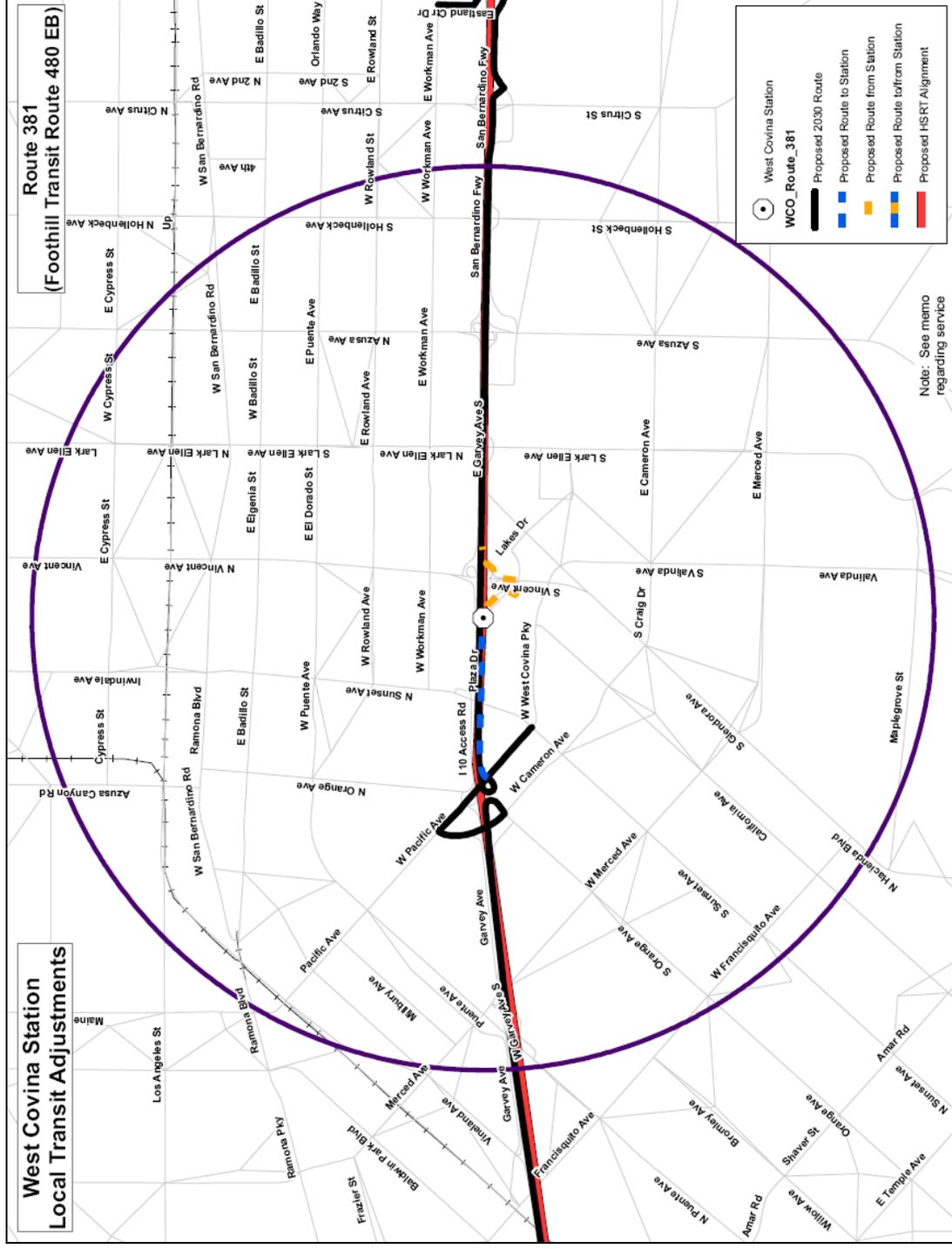
Source: SCAG Regional Travel Demand Model.

Figure 4.27 Adjustment to Foothill Transit Route 480, Westbound



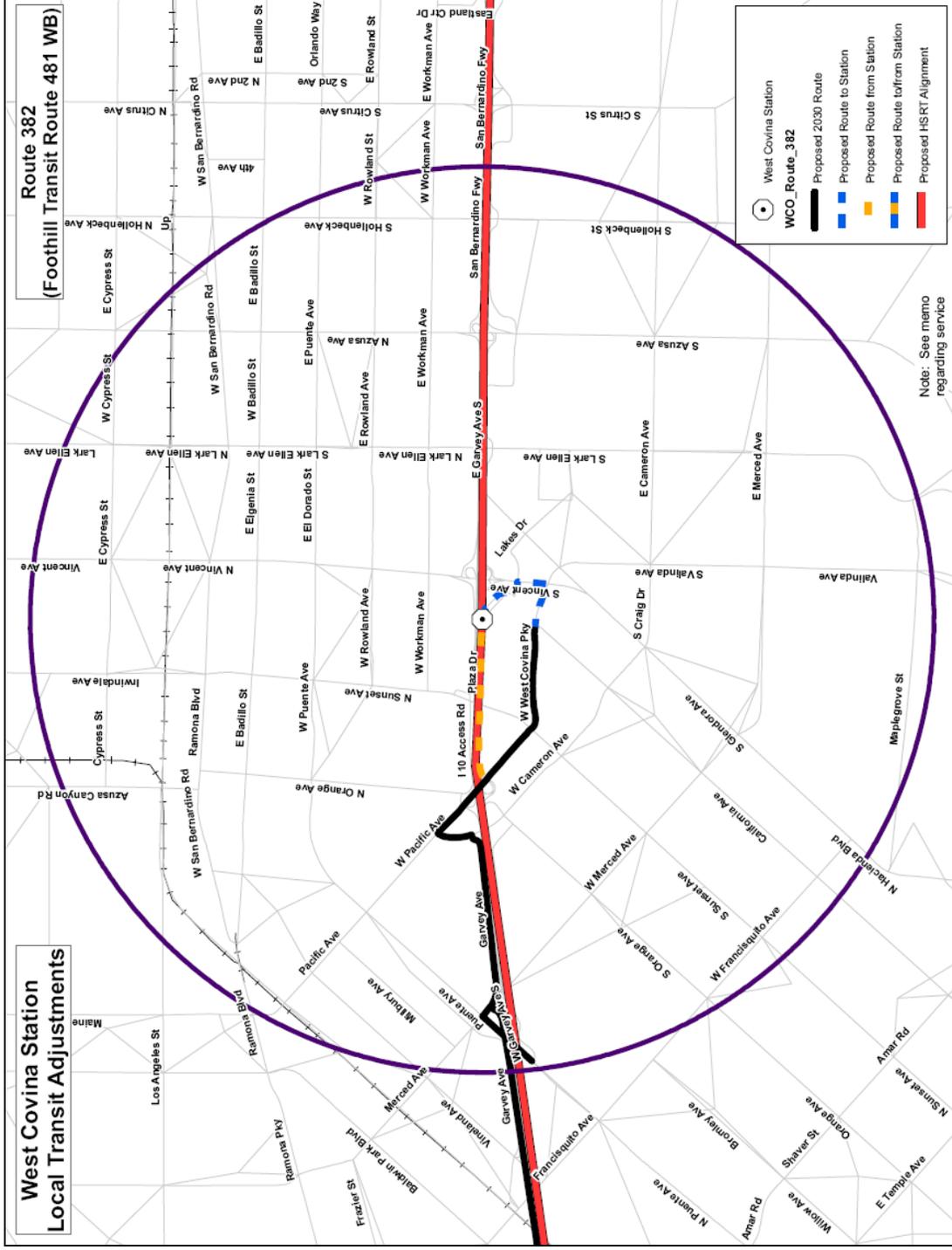
Source: SCAG Regional Travel Demand Model.

Figure 4.28 Adjustment to Foothill Transit Route 480, Eastbound



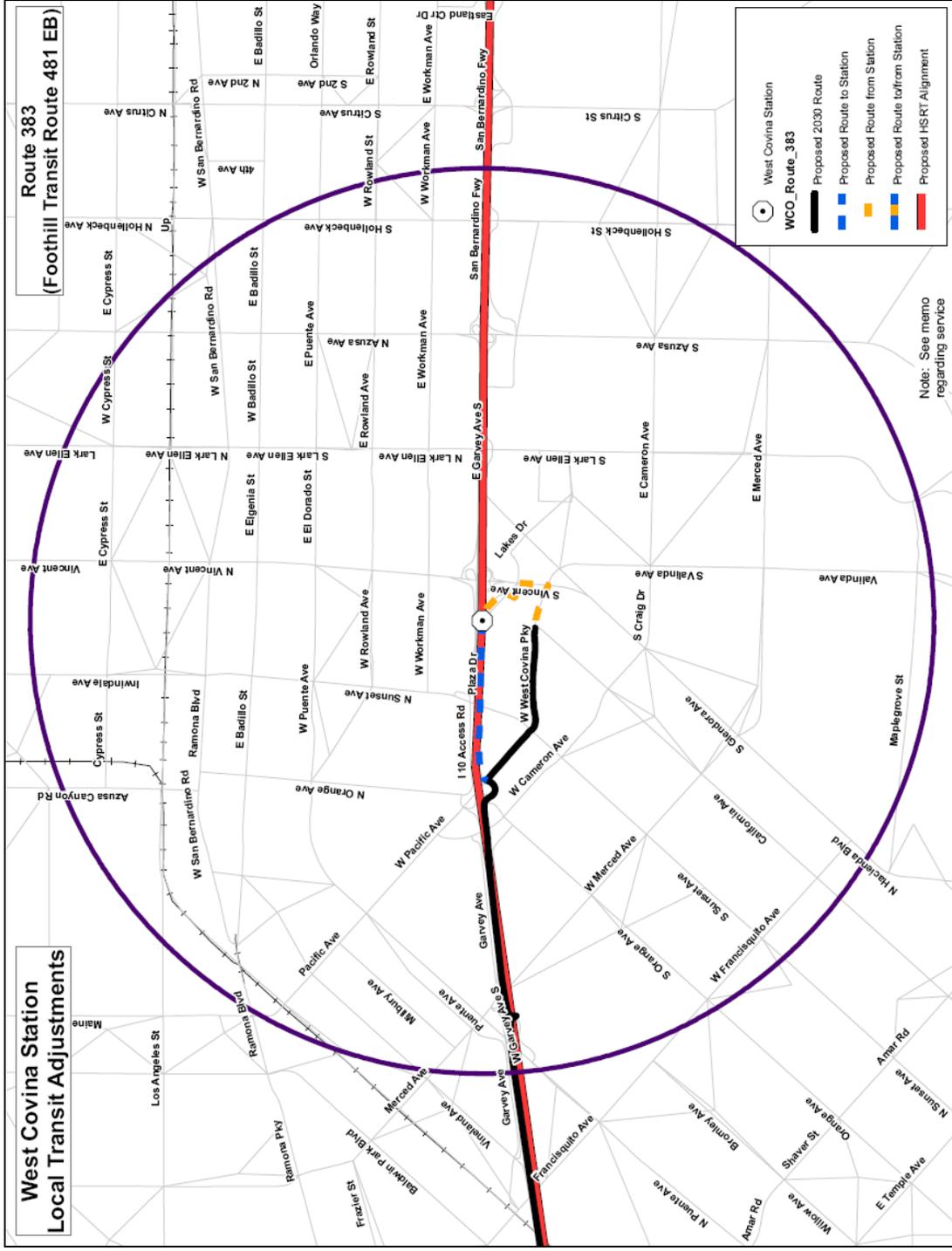
Source: SCAG Regional Travel Demand Model.

Figure 4.29 Adjustment to Foothill Transit Route 481, Westbound



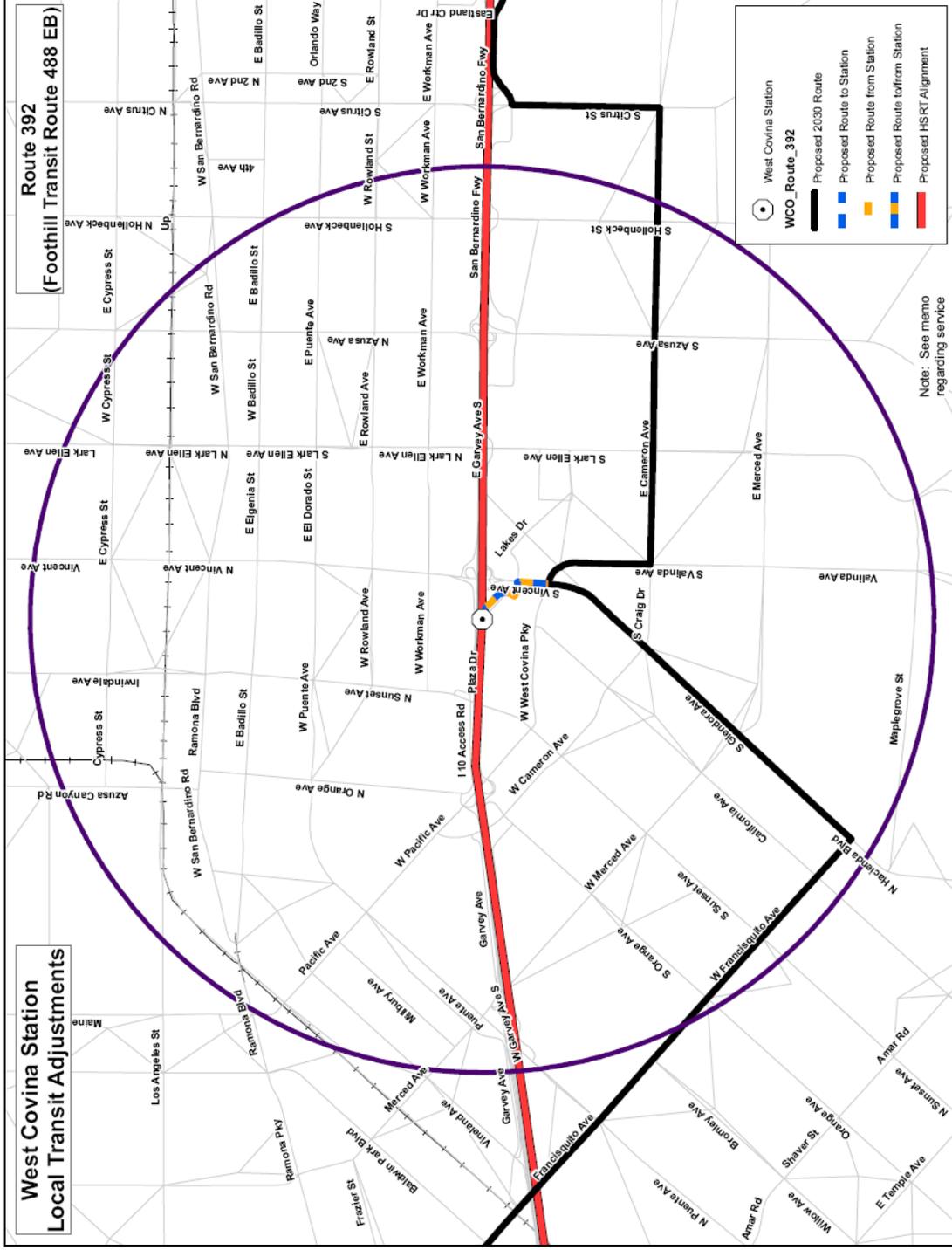
Source: SCAG Regional Travel Demand Model.

Figure 4.30 Adjustment to Foothill Transit Route 481, Eastbound



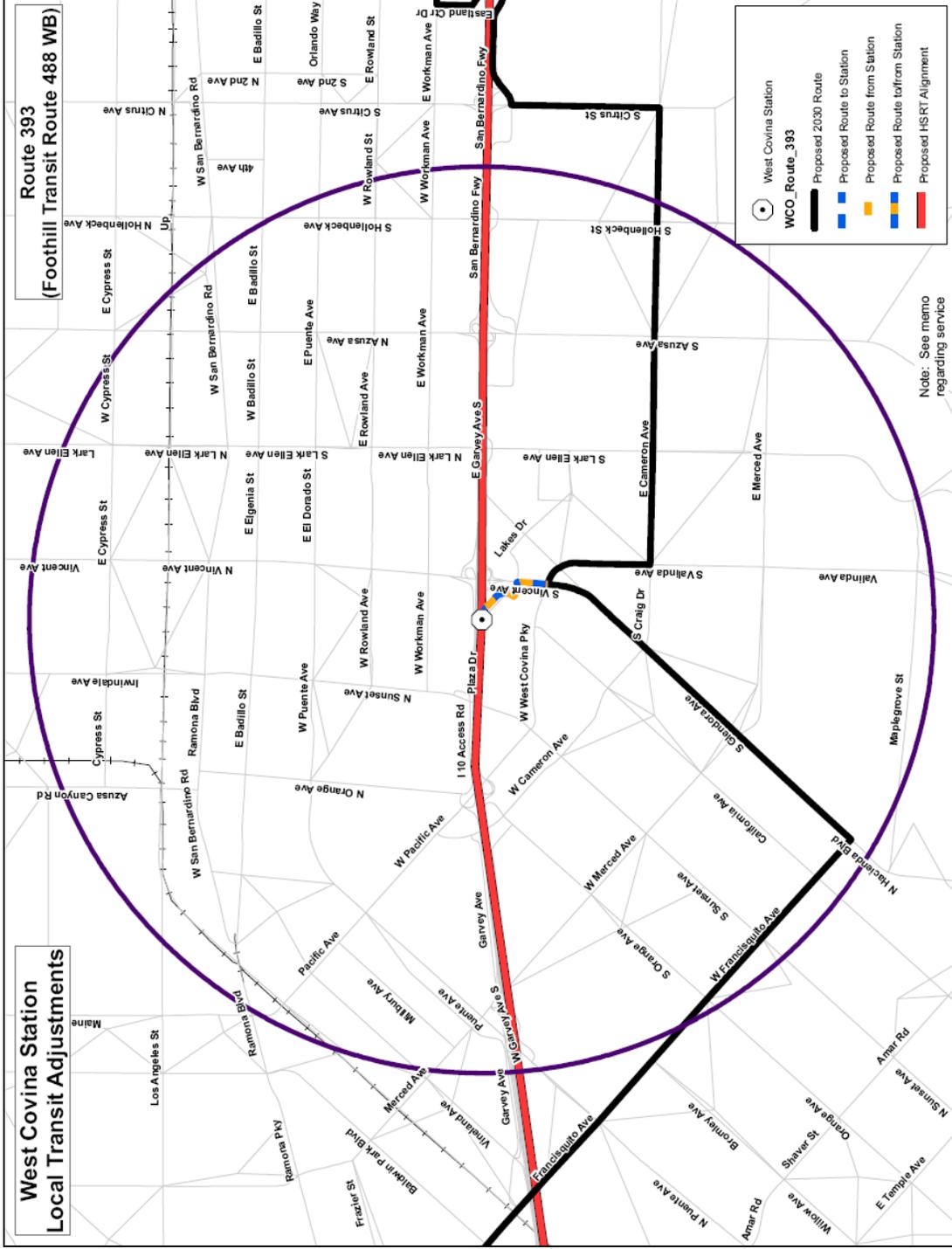
Source: SCAG Regional Travel Demand Model.

Figure 4.31 Adjustment to Foothill Transit Route 488, Eastbound



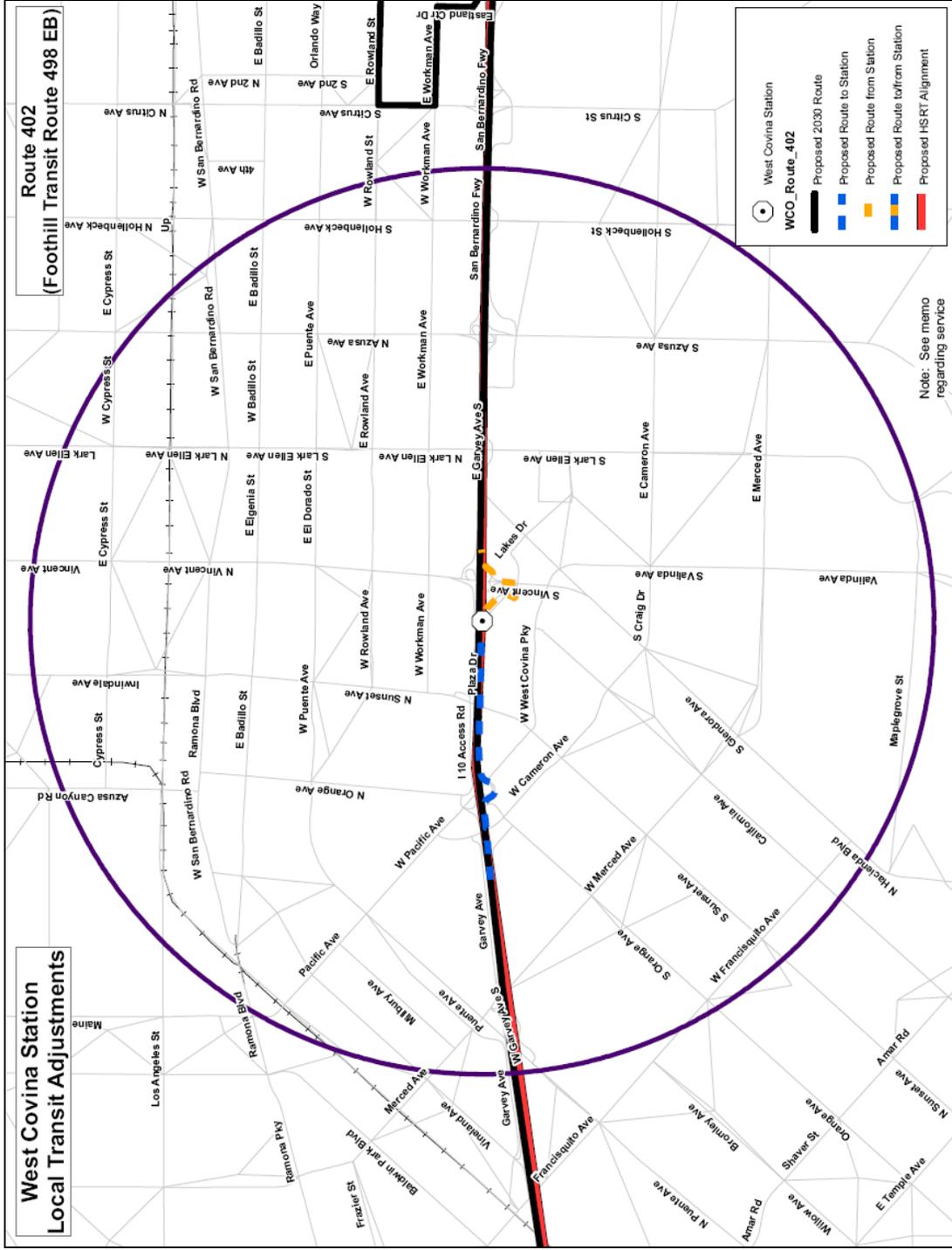
Source: SCAG Regional Travel Demand Model.

Figure 4.32 Adjustment to Foothill Transit Route 488, Westbound



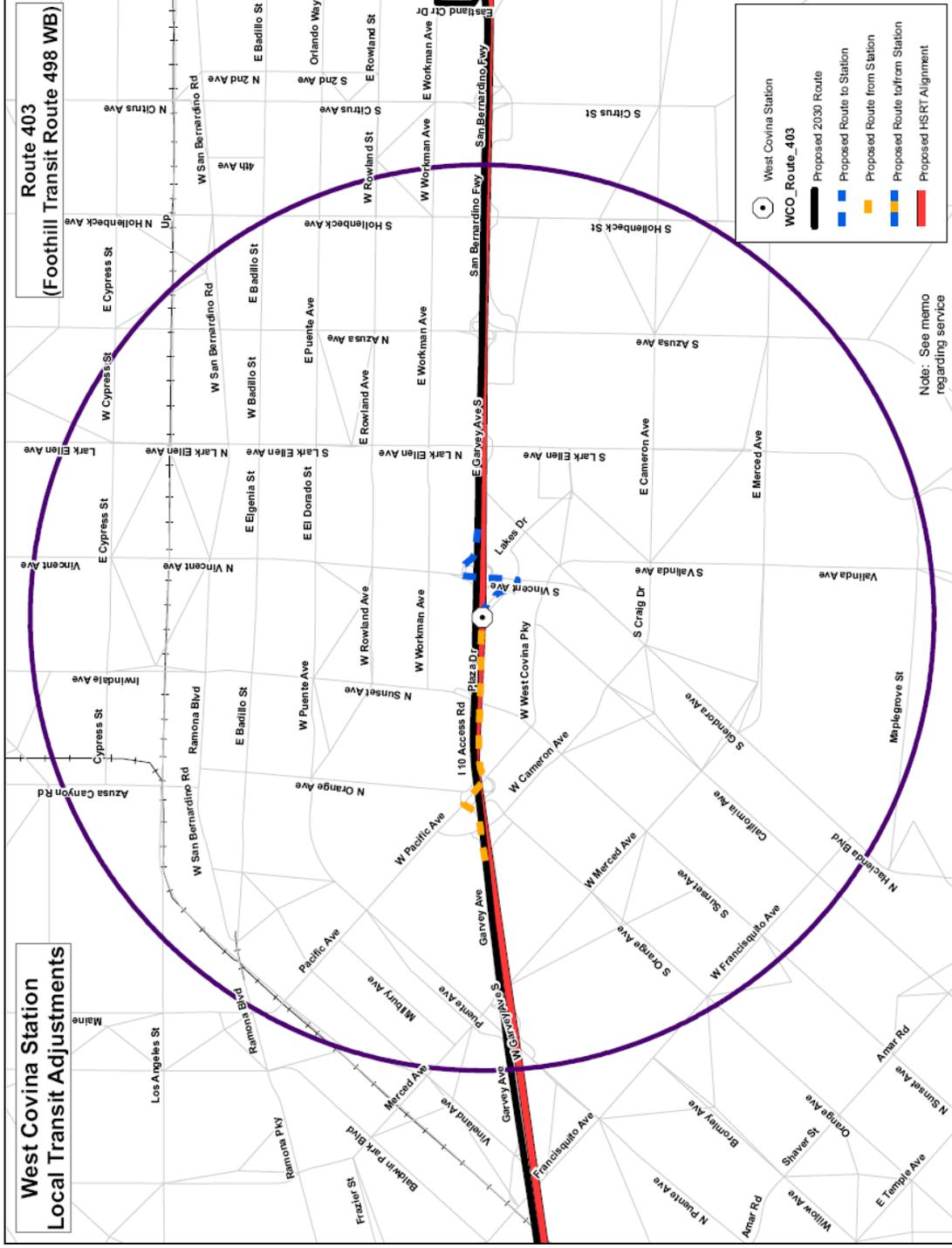
Source: SCAG Regional Travel Demand Model.

Figure 4.33 Adjustment to Foothill Transit Route 498, Eastbound



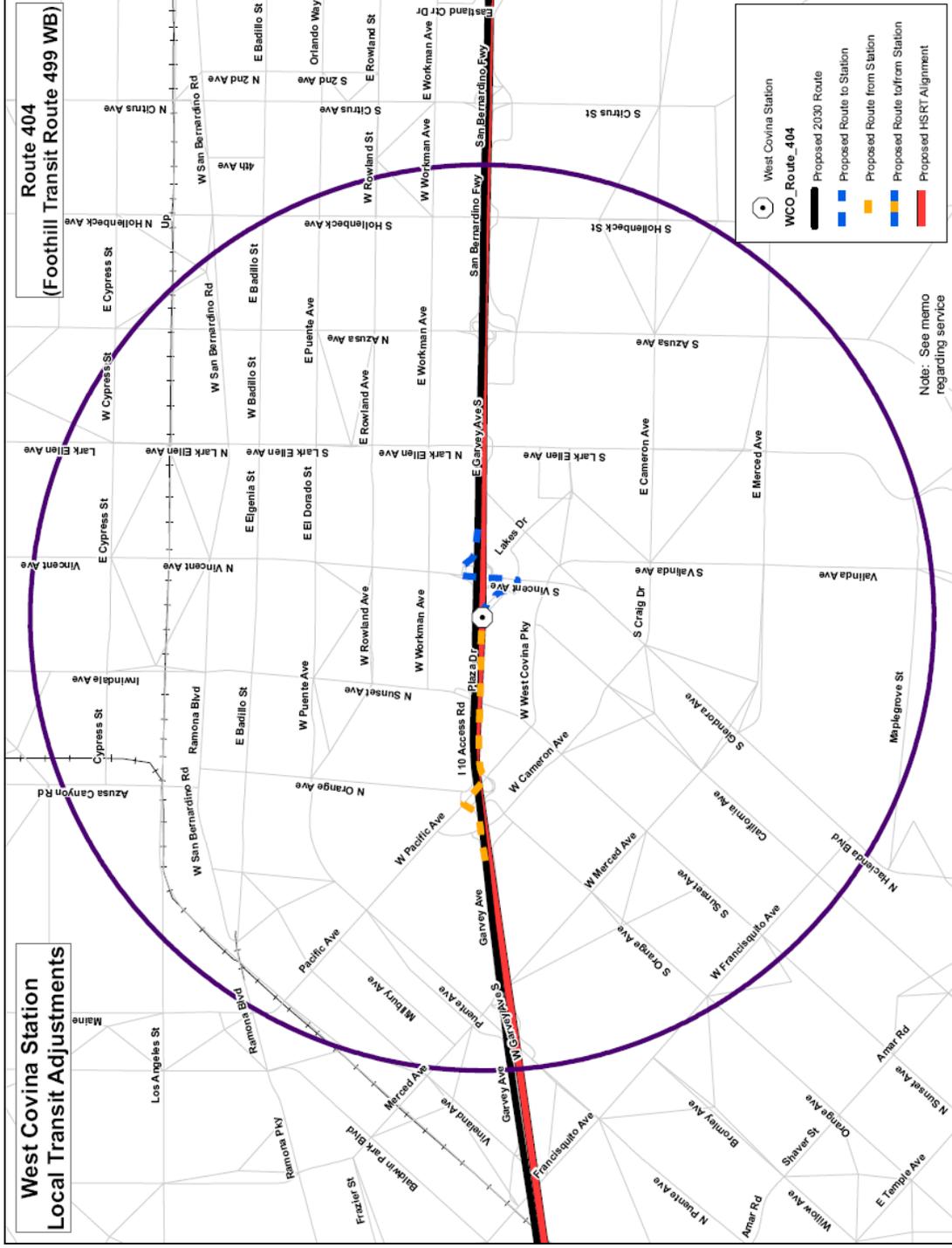
Source: SCAG Regional Travel Demand Model.

Figure 4.34 Adjustment to Foothill Transit Route 498, Westbound



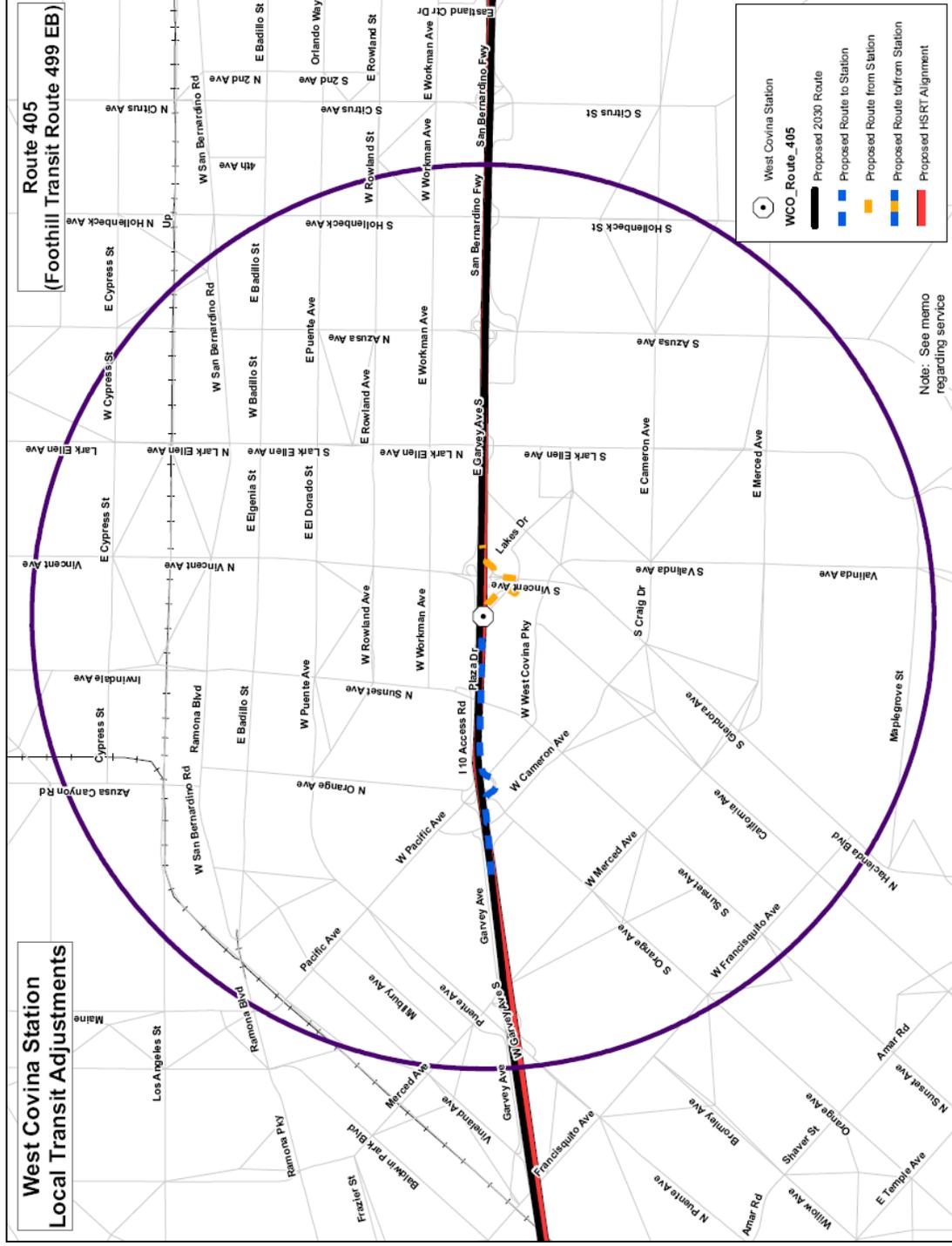
Source: SCAG Regional Travel Demand Model.

Figure 4.35 Adjustment to Foothill Transit Route 499, Westbound



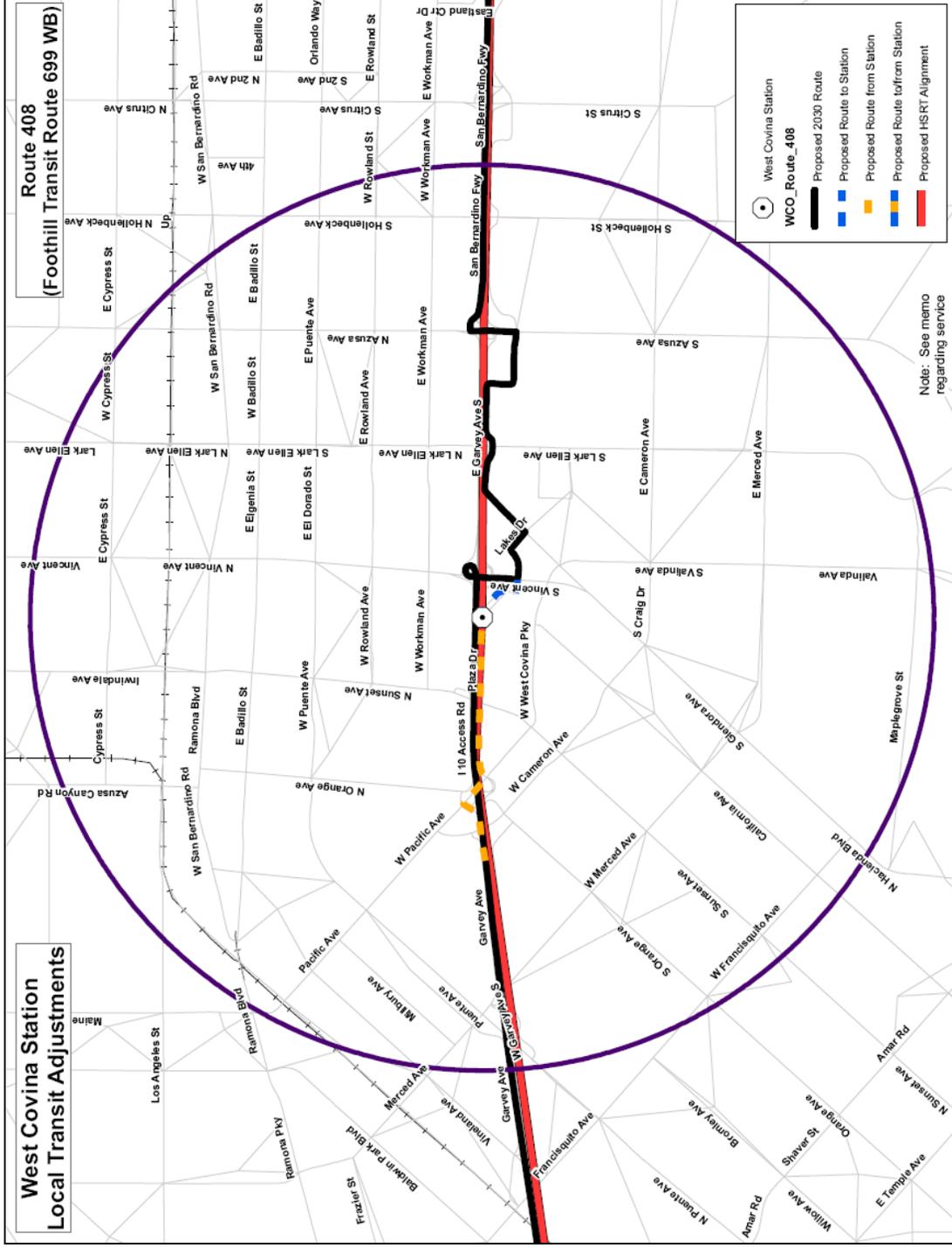
Source: SCAG Regional Travel Demand Model.

Figure 4.36 Adjustment to Foothill Transit Route 499, Eastbound



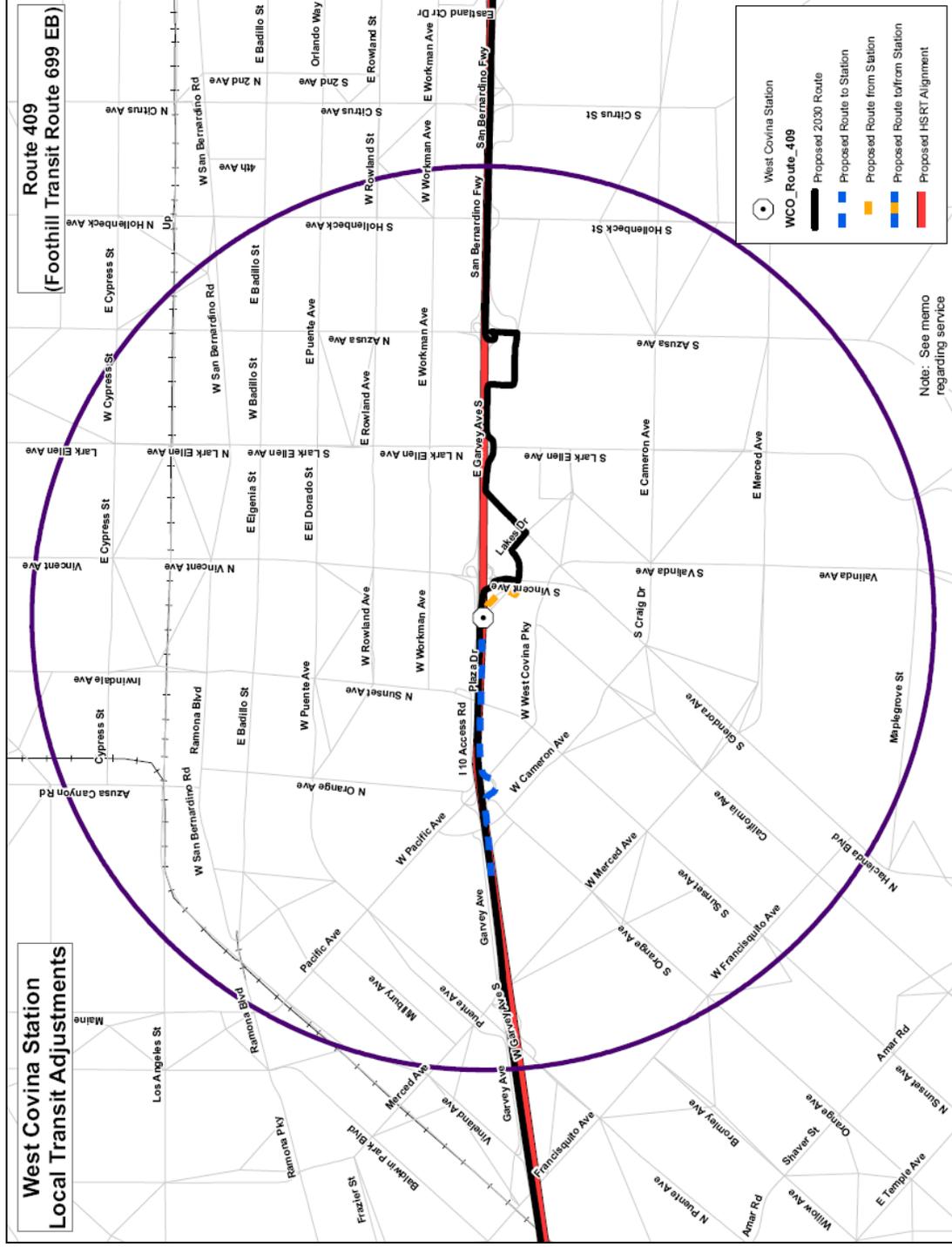
Source: SCAG Regional Travel Demand Model.

Figure 4.37 Adjustment to Foothill Transit Route 699, Westbound



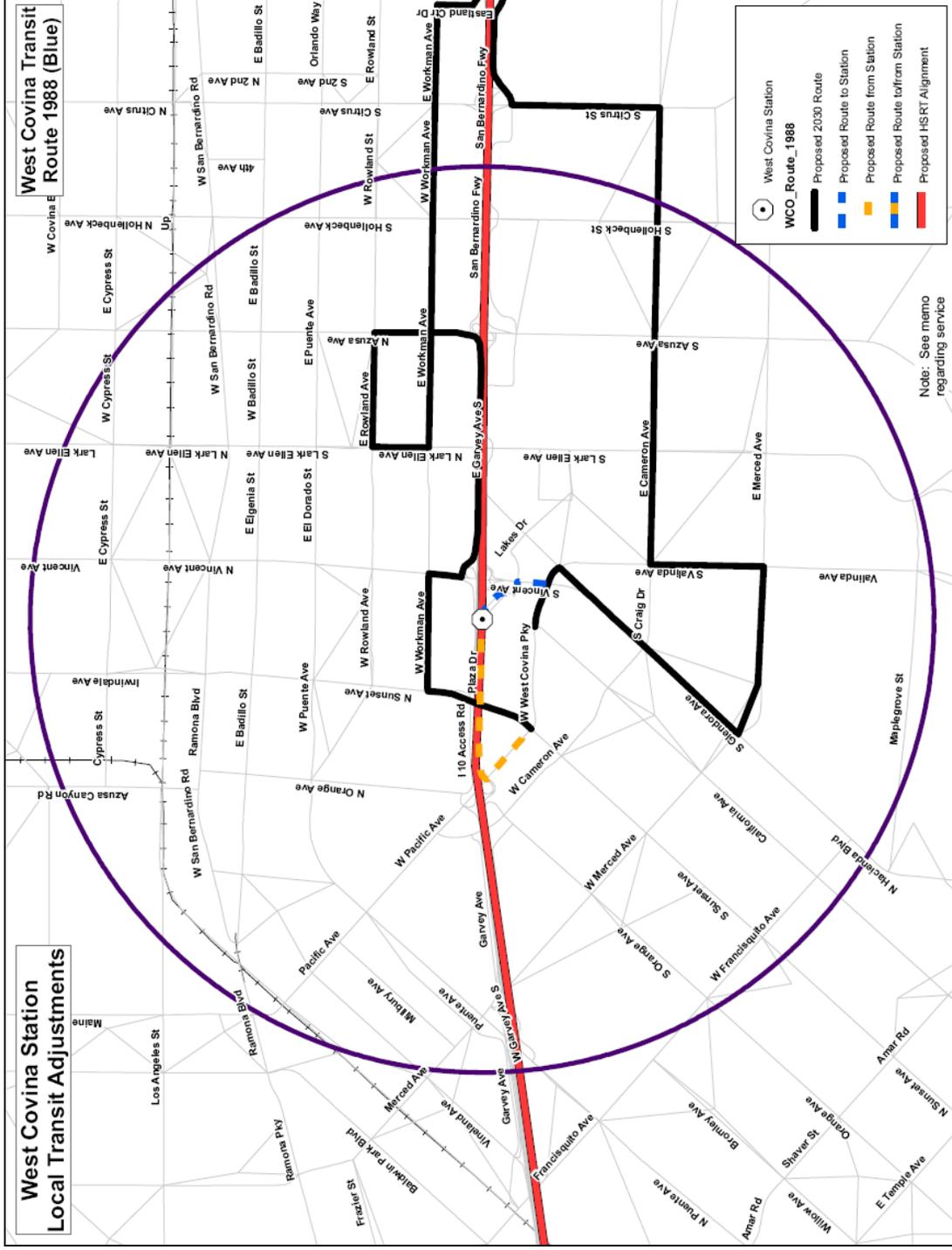
Source: SCAG Regional Travel Demand Model.

Figure 4.38 Adjustment to Foothill Transit Route 699, Eastbound



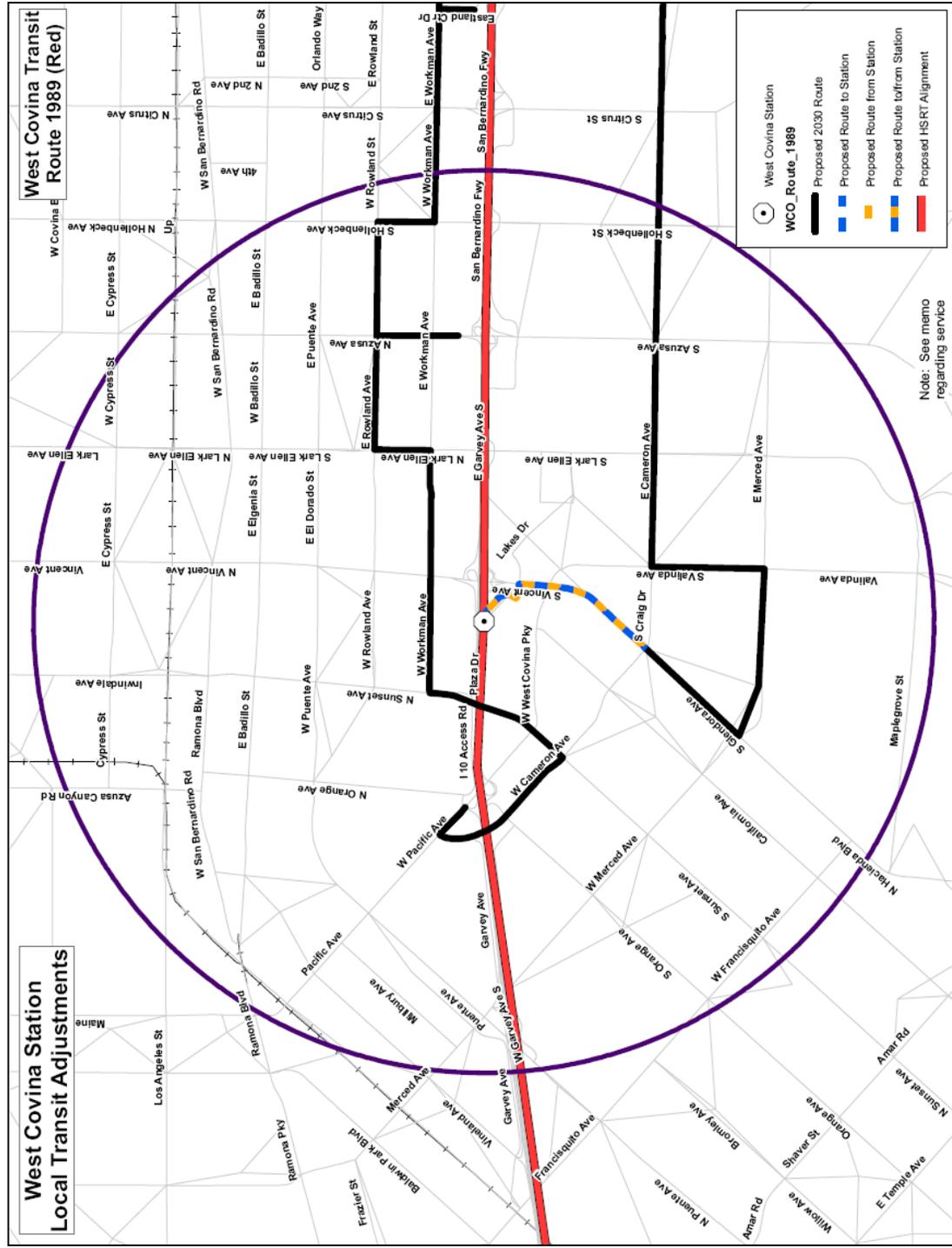
Source: SCAG Regional Travel Demand Model.

Figure 4.39 Adjustment to West Covina Transit Blue Line



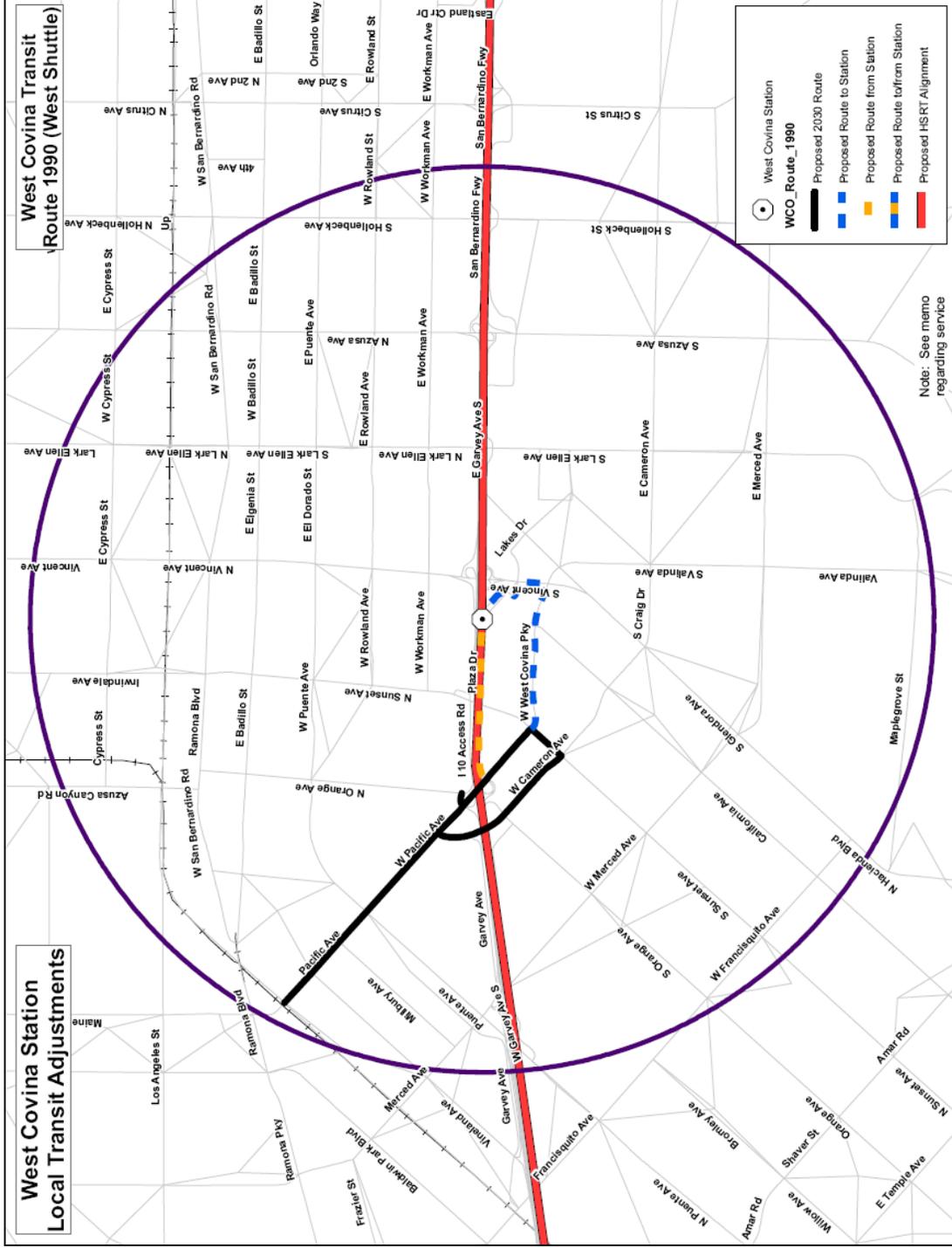
Source: SCAG Regional Travel Demand Model.

Figure 4.40 Adjustment to West Covina Transit Red Line



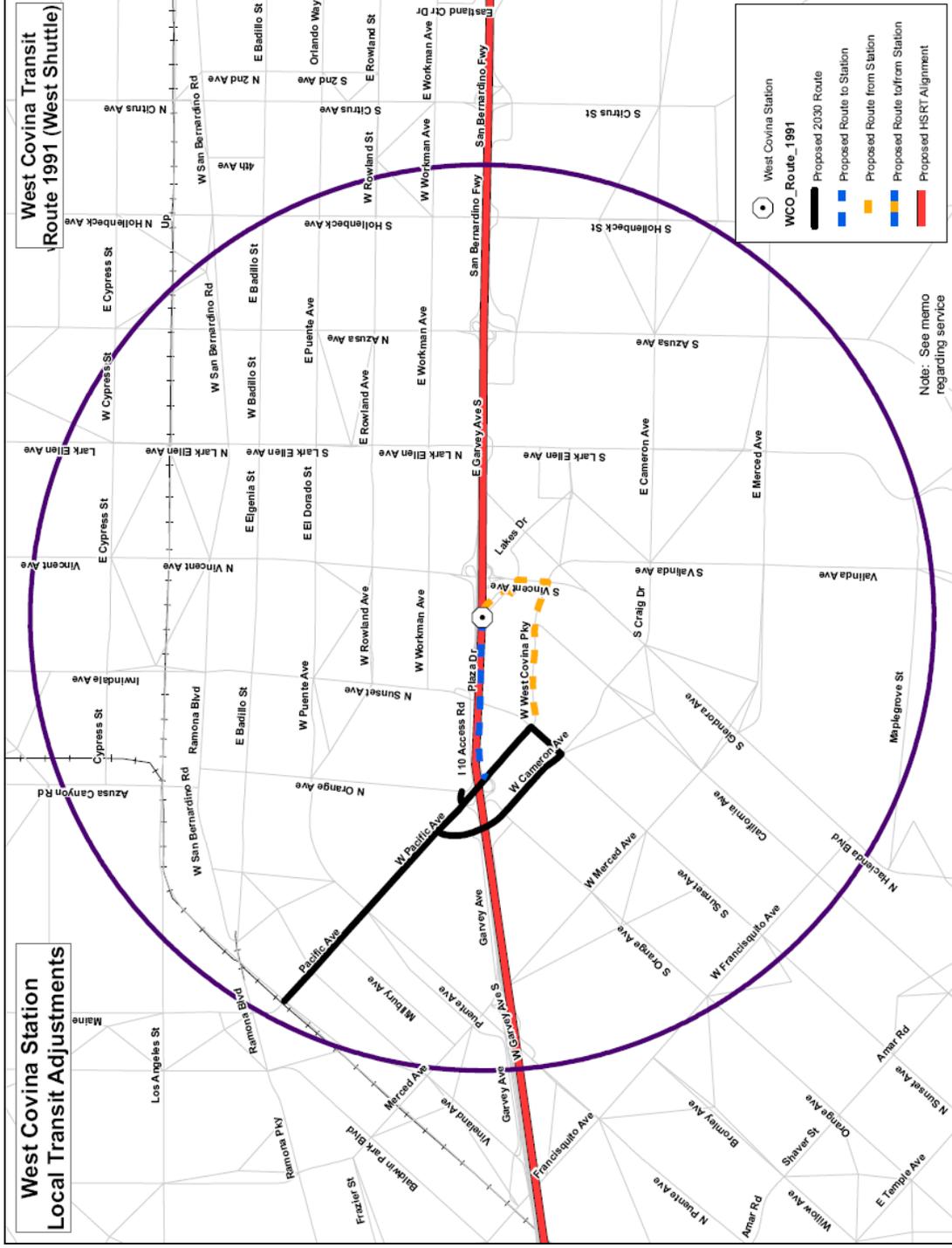
Source: SCAG Regional Travel Demand Model.

Figure 4.41 Adjustment to West Covina Transit West Shuttle



Source: SCAG Regional Travel Demand Model.

Figure 4.42 Adjustment to West Covina Transit West Shuttle

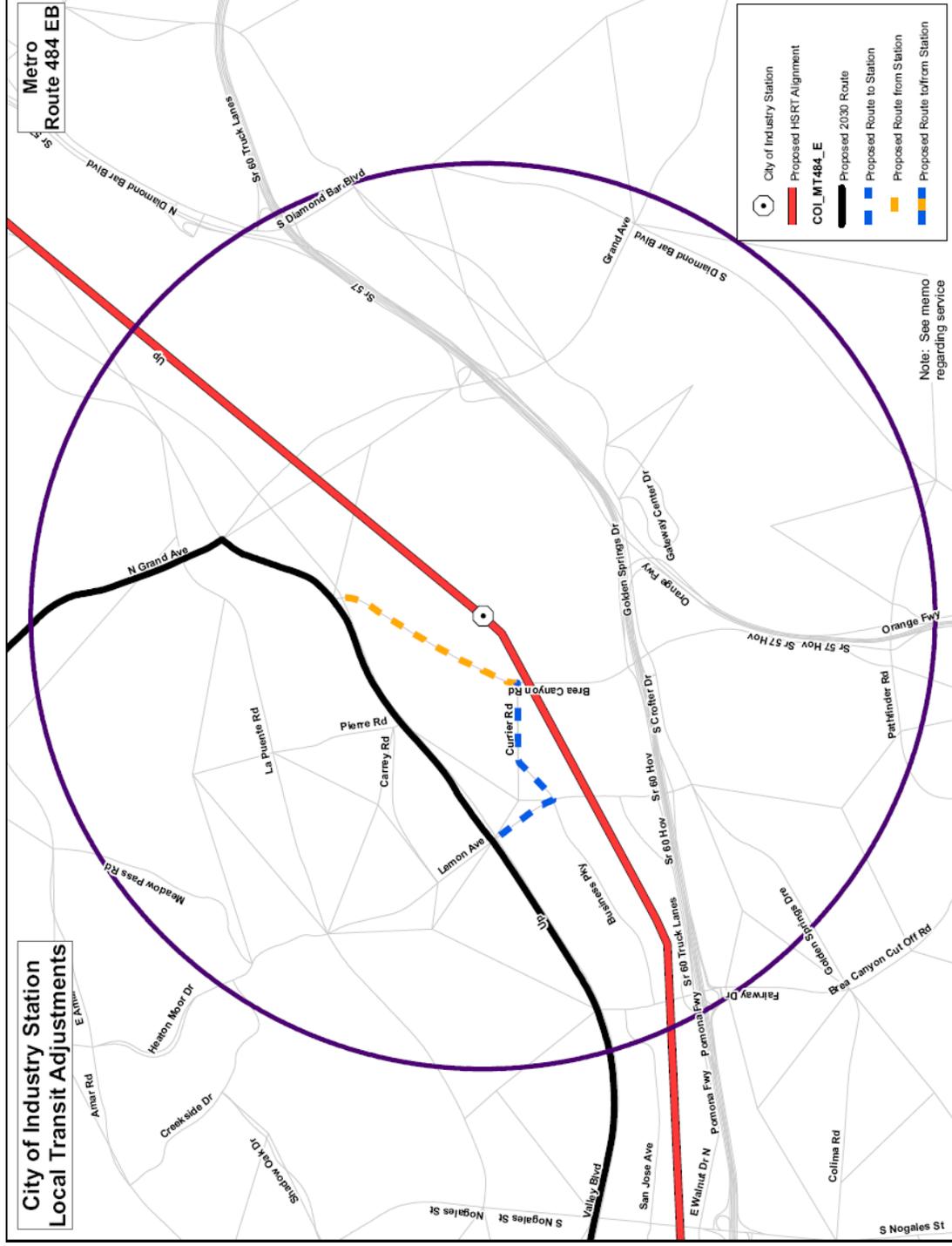


Source: SCAG Regional Travel Demand Model.

## **4.2 ADJUSTMENTS TO LOCAL TRANSIT - CITY OF INDUSTRY**

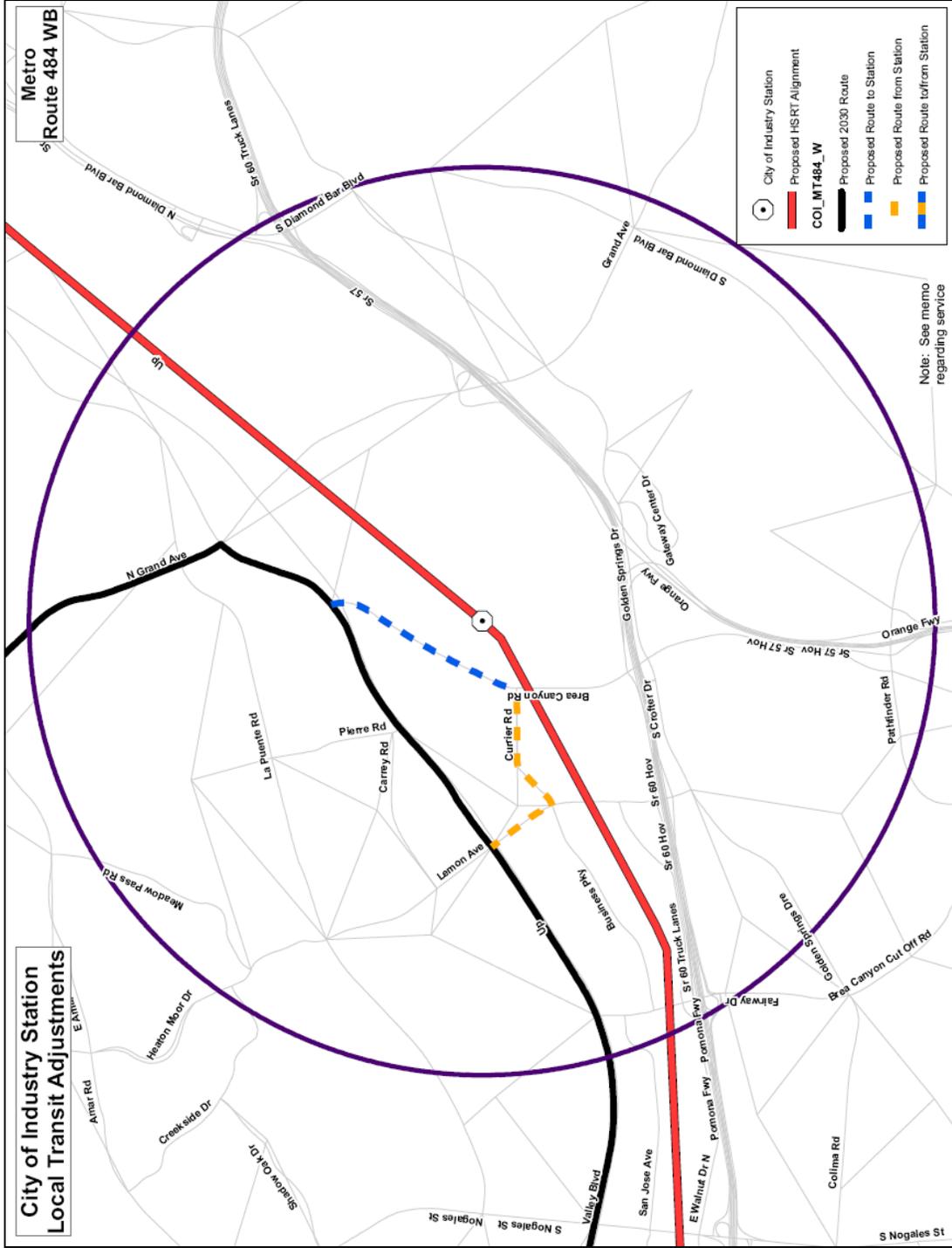
Year 2025 transit routes in the vicinity of the proposed City of Industry HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 4.43 to Figure 4.63. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 4.43 Adjustment to Metro Route 484, Eastbound



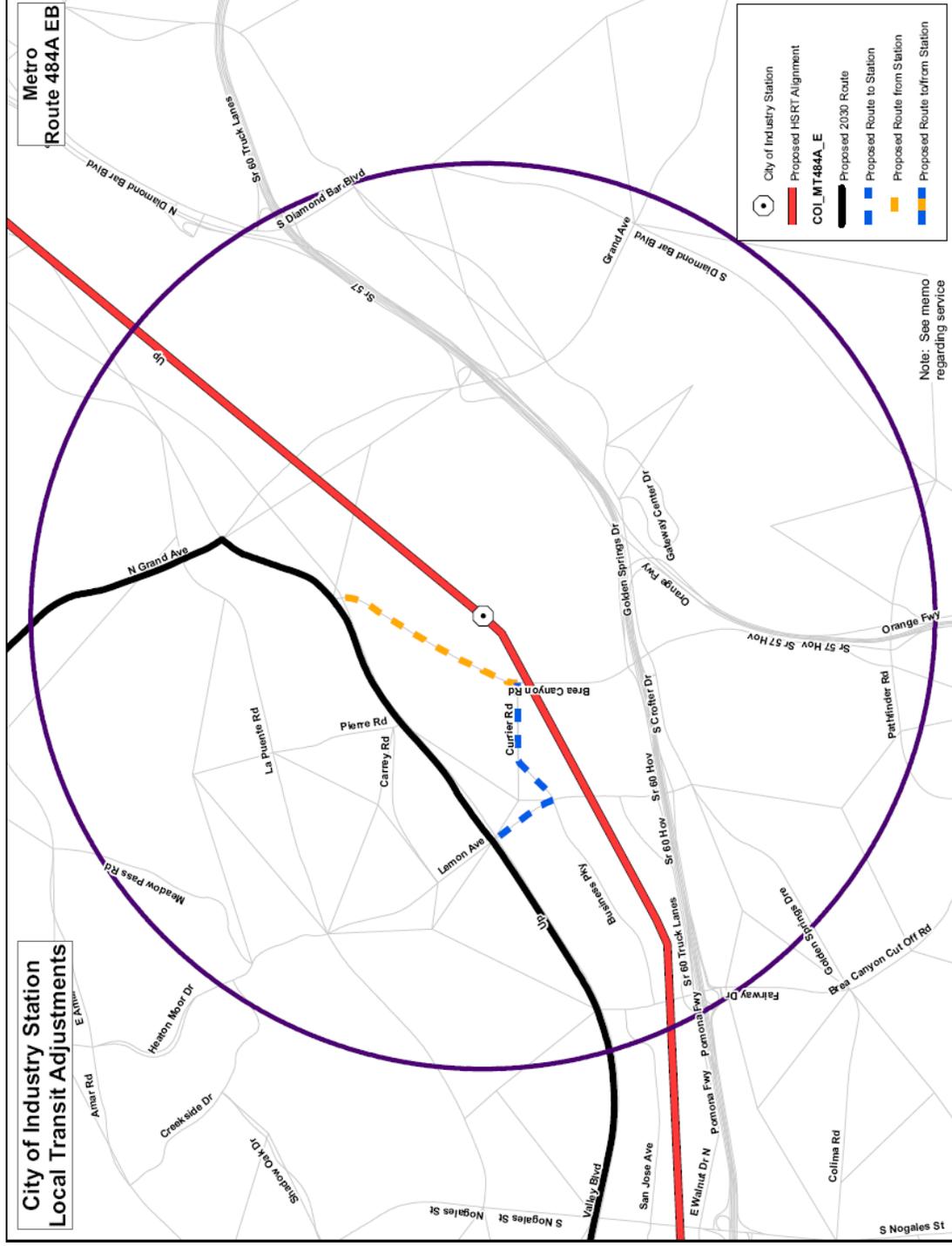
Source: SCAG Regional Travel Demand Model.

Figure 4.44 Adjustment to Metro Route 484, Westbound



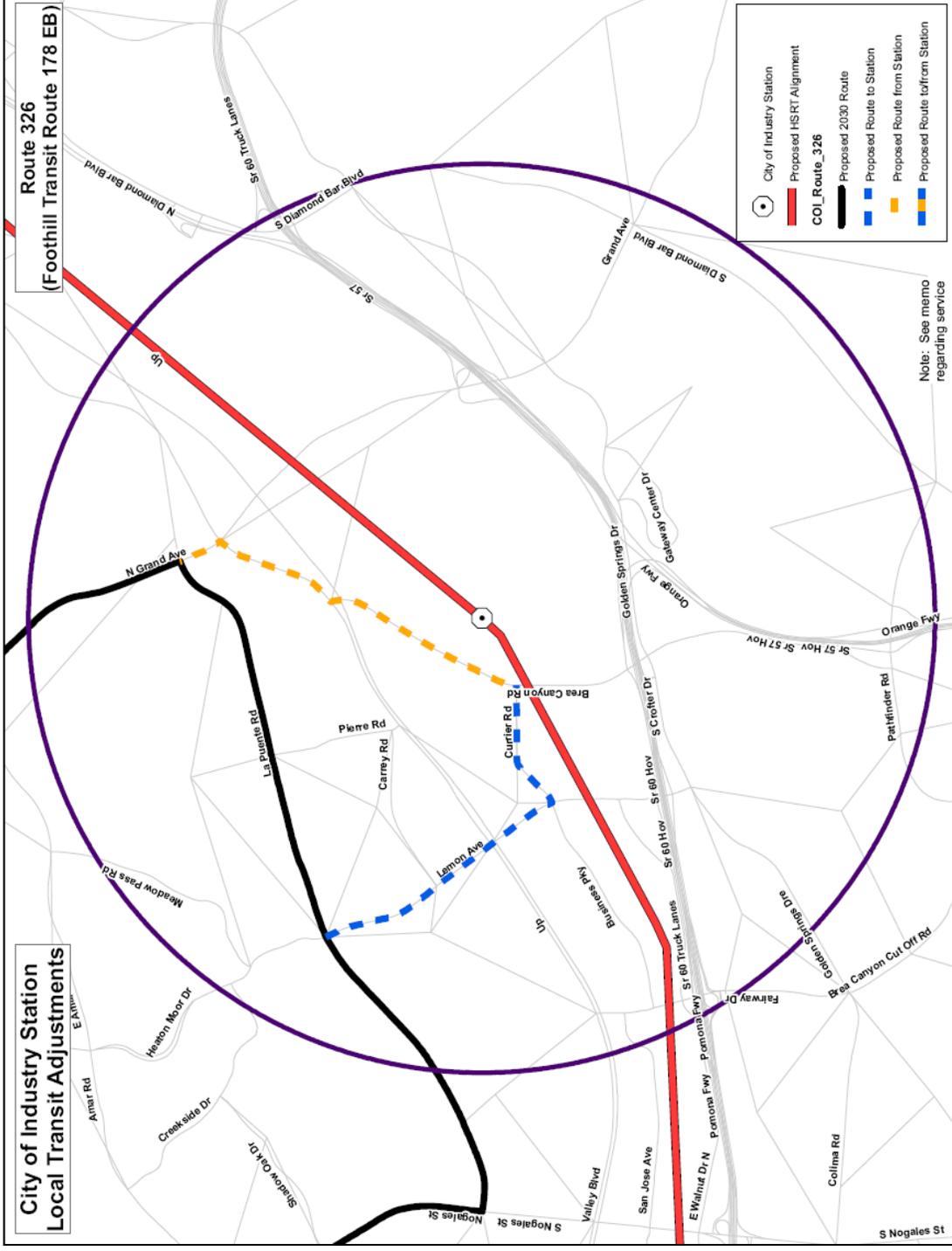
Source: SCAG Regional Travel Demand Model.

Figure 4.45 Adjustment to Metro Route 484A, Eastbound



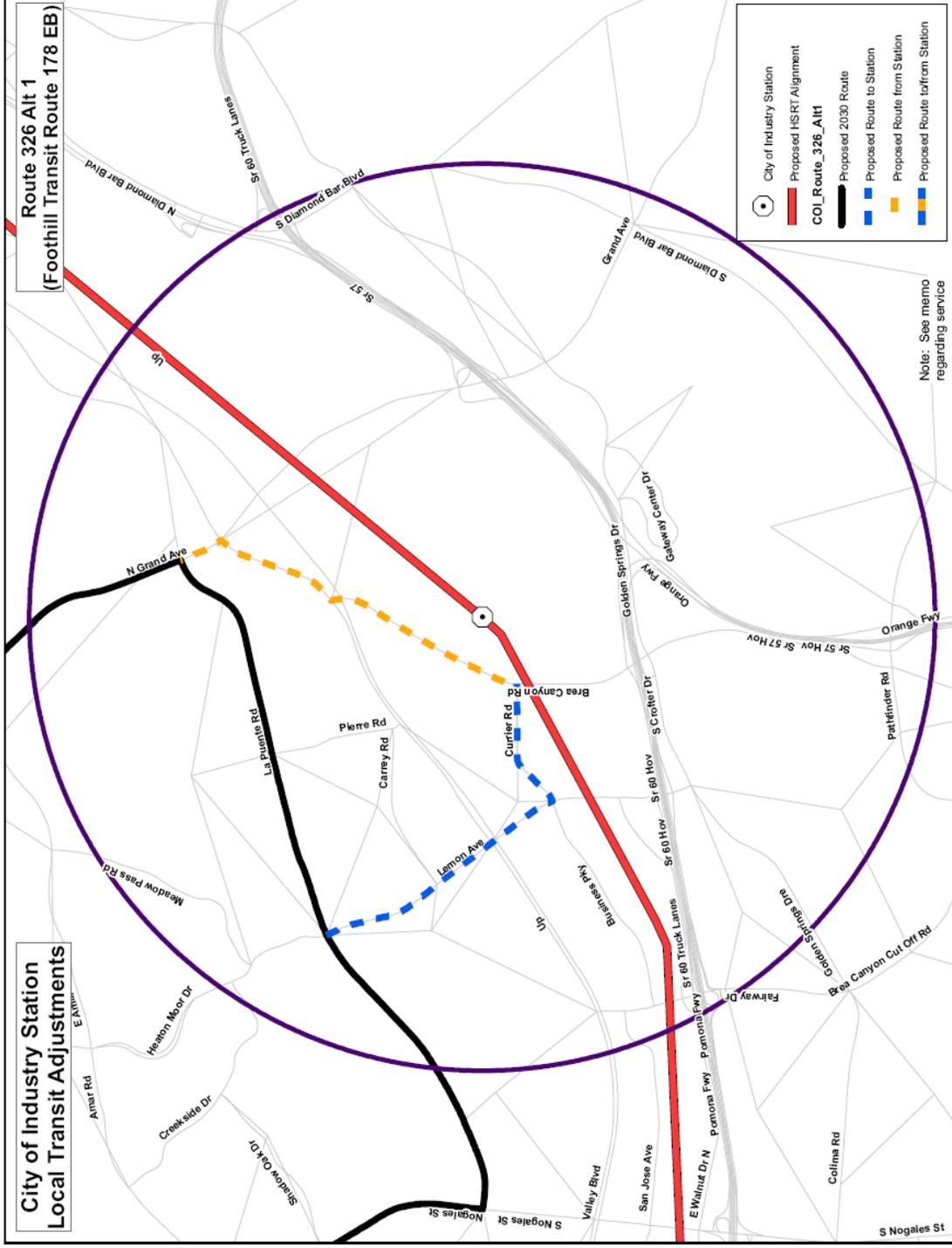
Source: SCAG Regional Travel Demand Model.

Figure 4.46 Adjustment to Foothill Transit Route 178, Eastbound



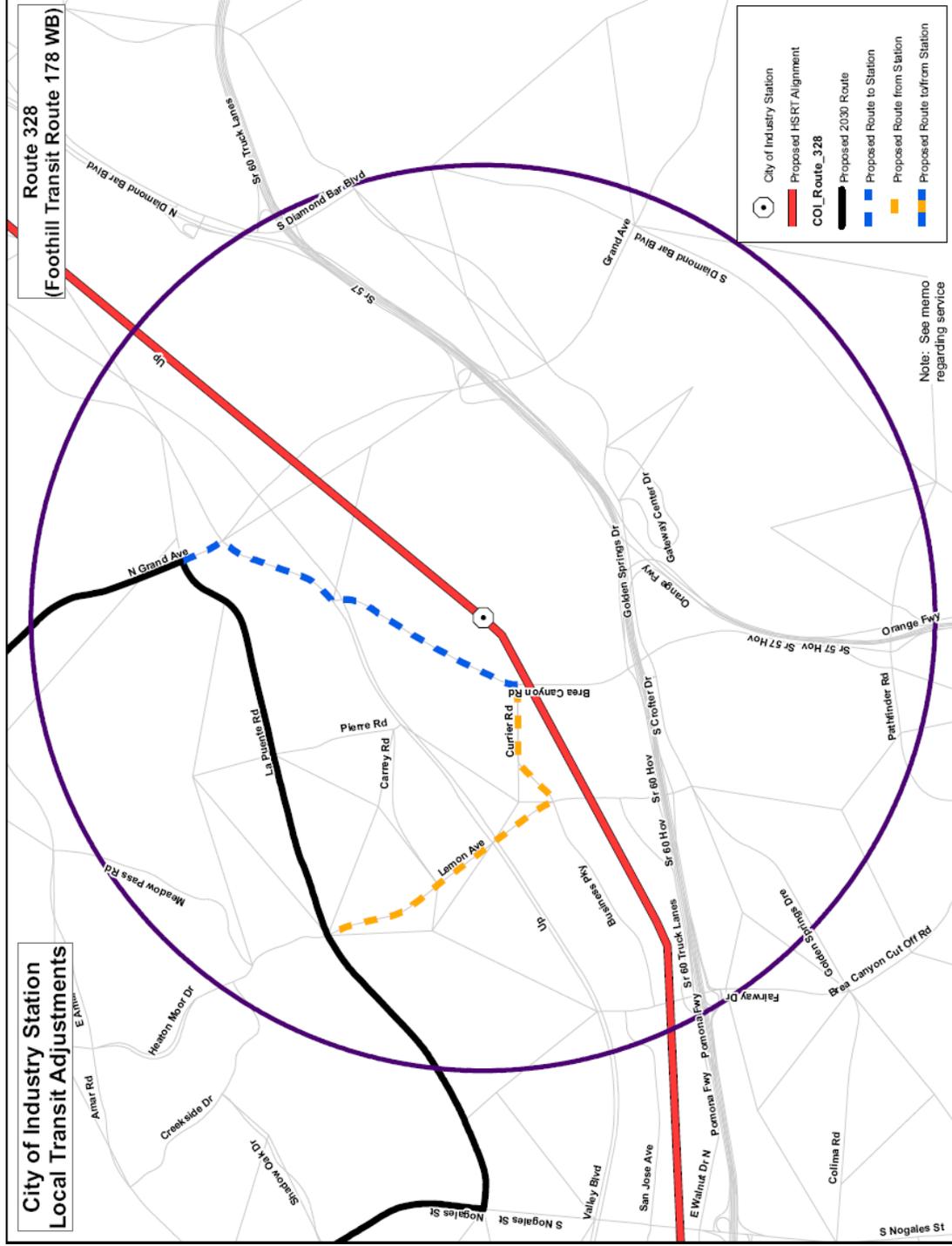
Source: SCAG Regional Travel Demand Model.

Figure 4.47 Adjustment to Foothill Transit Route 178, Eastbound



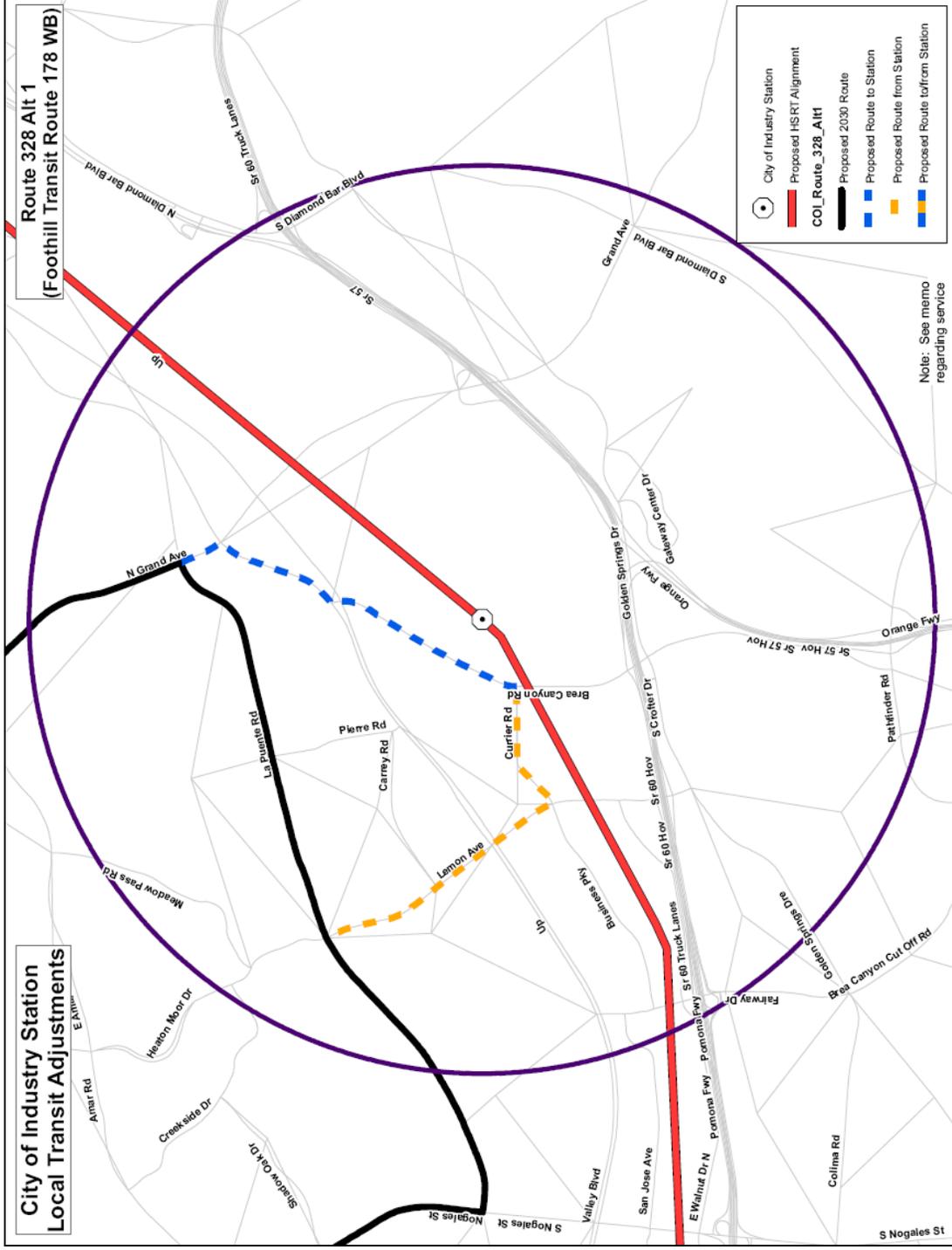
Source: SCAG Regional Travel Demand Model.

Figure 4.48 Adjustment to Foothill Transit Route 178, Westbound



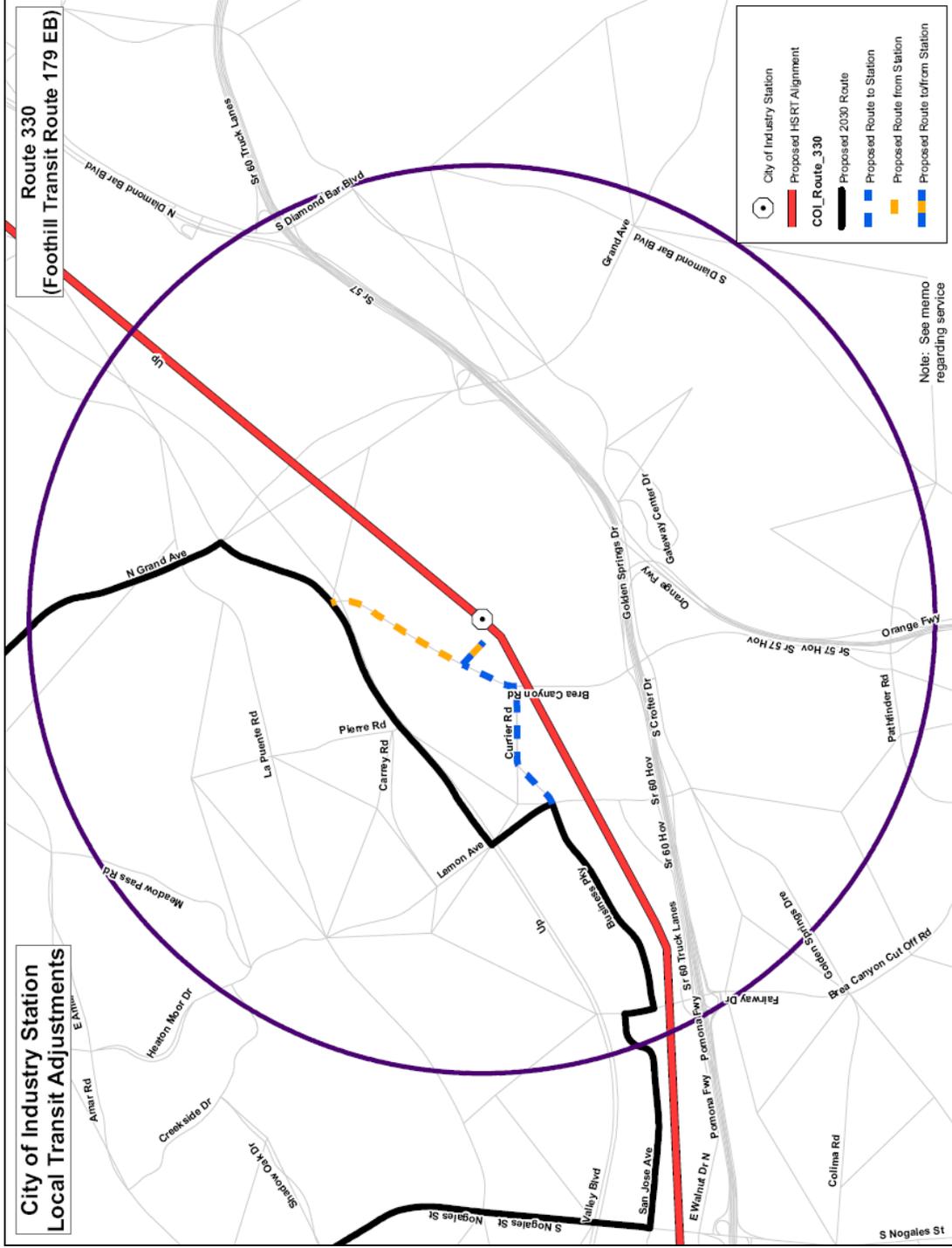
Source: SCAG Regional Travel Demand Model.

Figure 4.49 Adjustment to Foothill Transit Route 178, Westbound



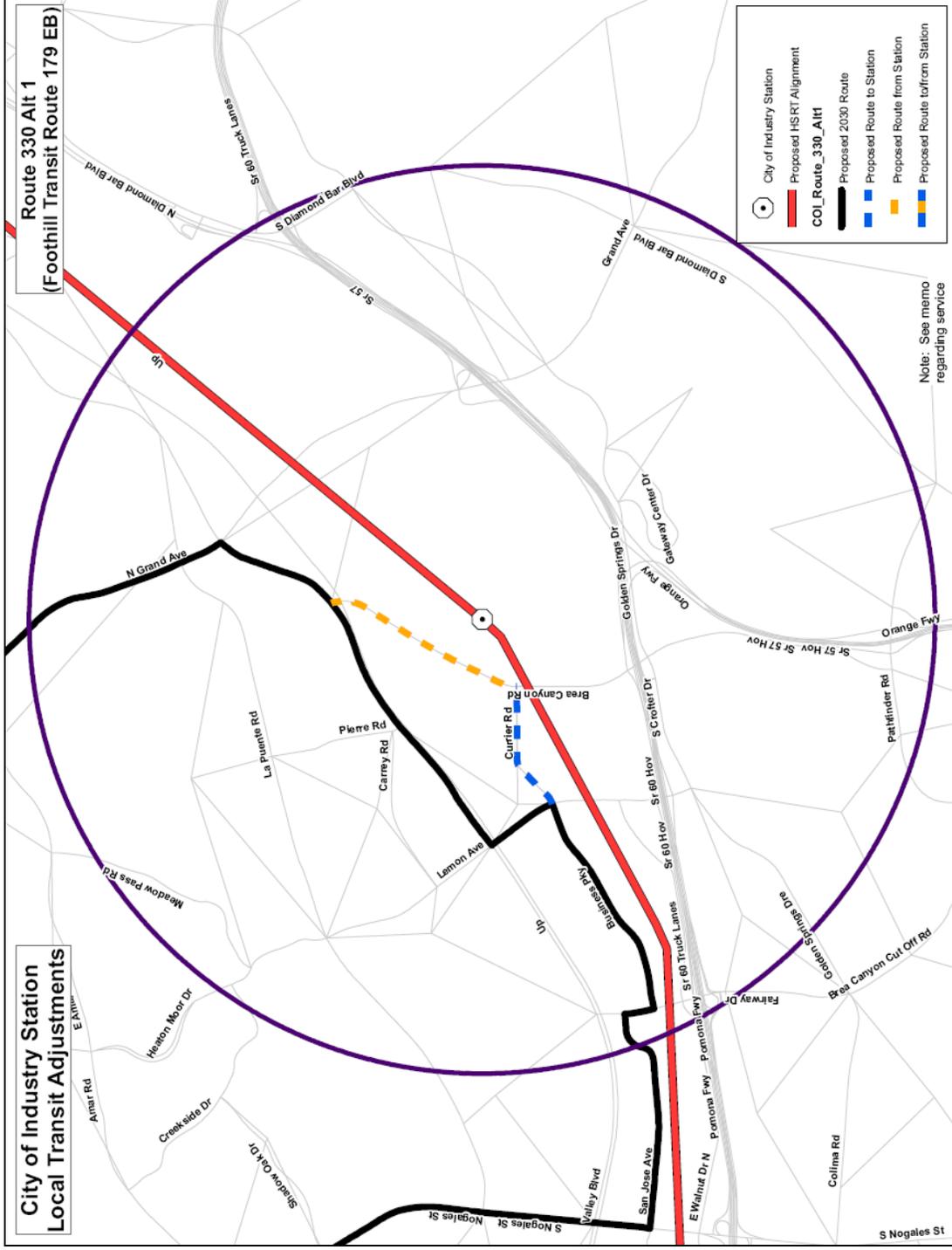
Source: SCAG Regional Travel Demand Model.

Figure 4.50 Adjustment to Foothill Transit Route 179, Eastbound



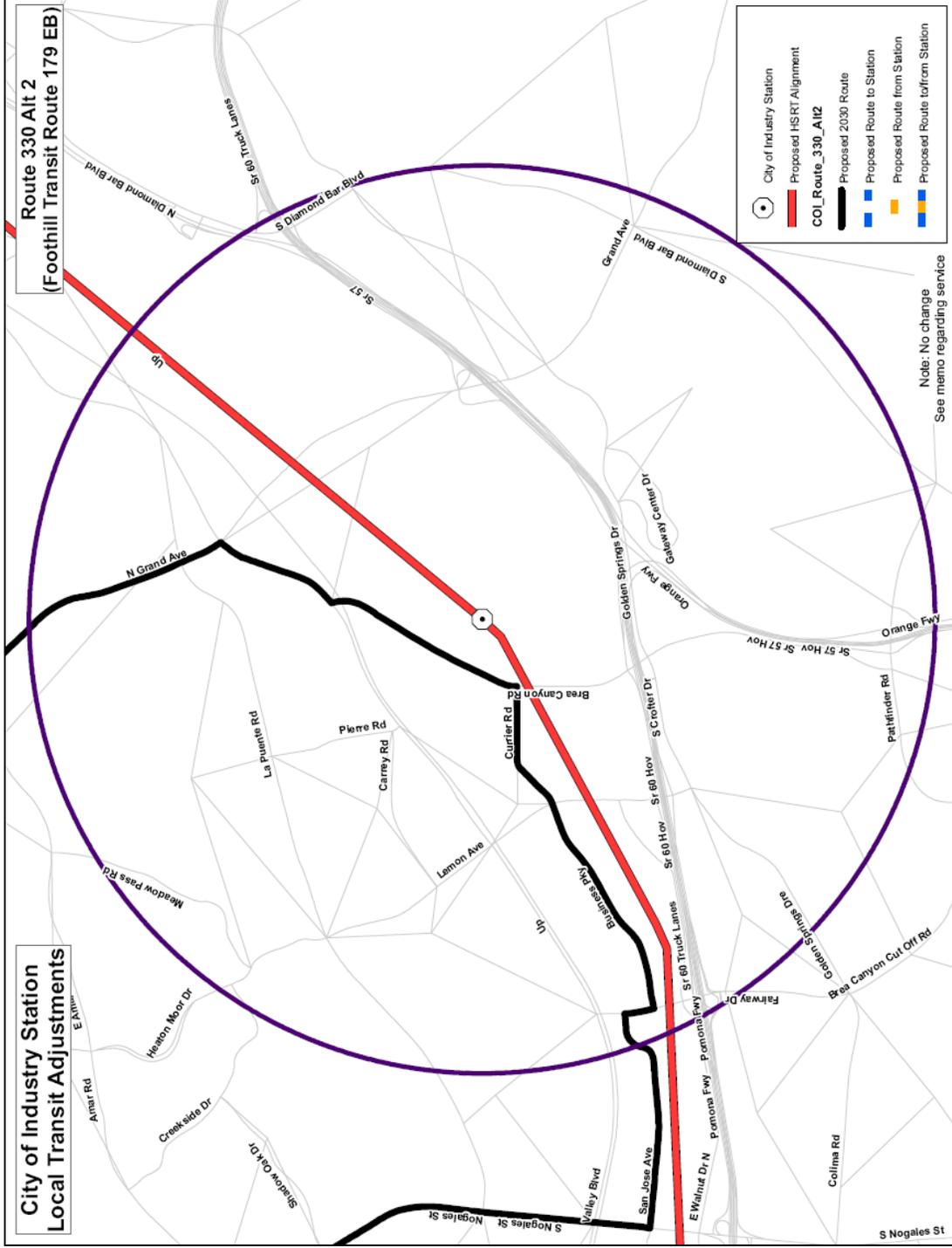
Source: SCAG Regional Travel Demand Model.

Figure 4.51 Adjustment to Foothill Transit Route 179, Eastbound



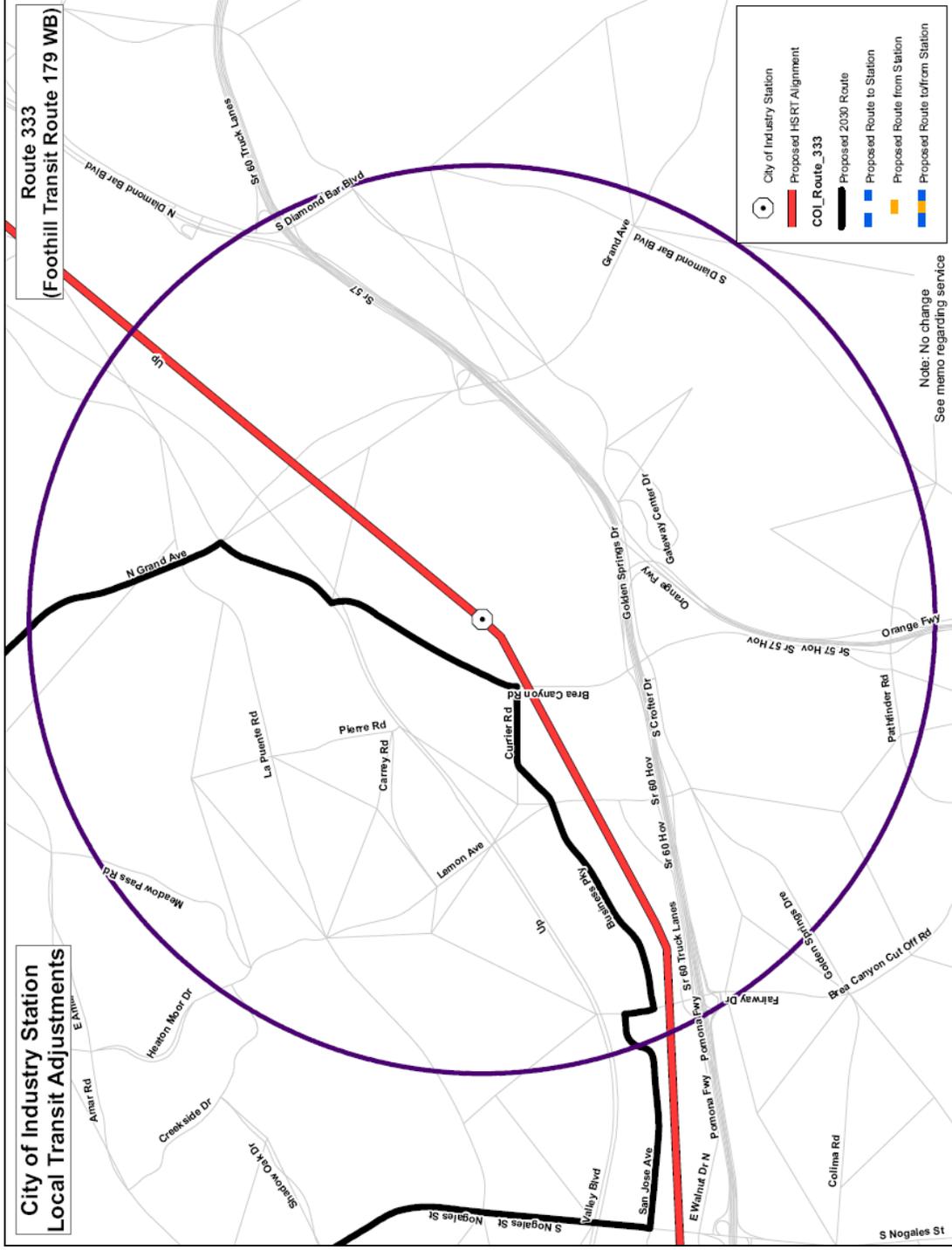
Source: SCAG Regional Travel Demand Model.

Figure 4.52 Adjustment to Foothill Transit Route 179, Eastbound



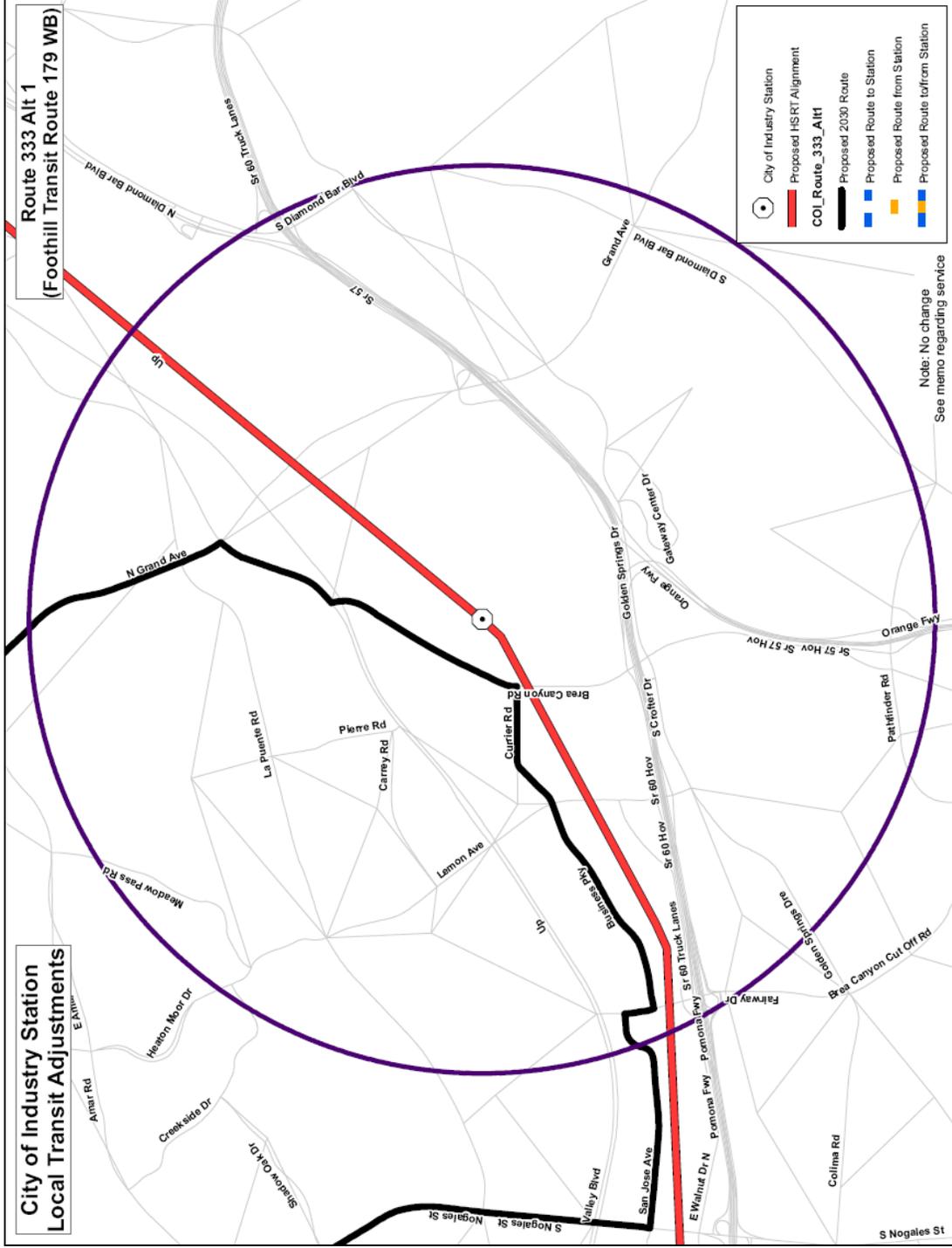
Source: SCAG Regional Travel Demand Model.

Figure 4.53 Adjustment to Foothill Transit Route 179, Westbound



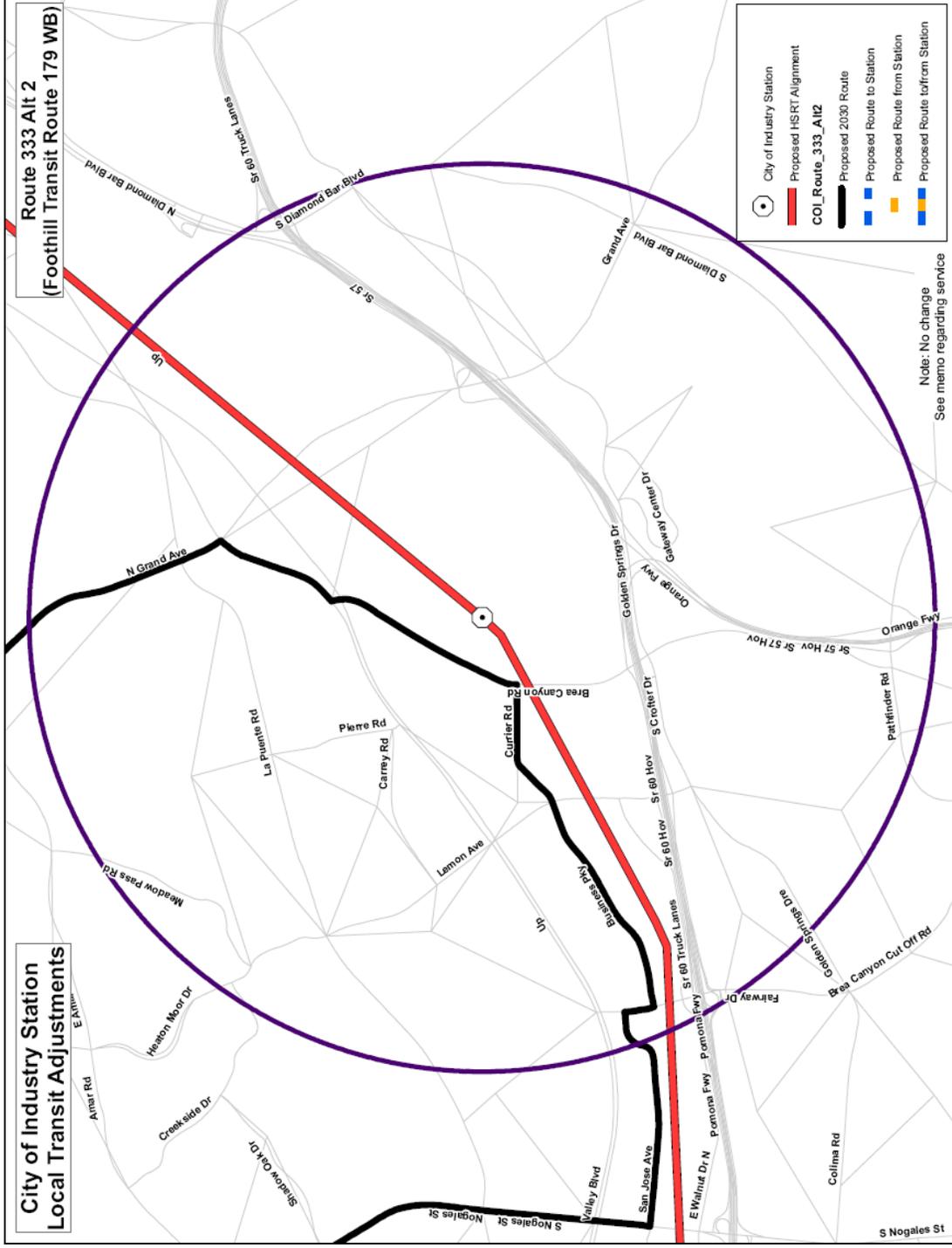
Source: SCAG Regional Travel Demand Model.

Figure 4.54 Adjustment to Foothill Transit Route 179, Westbound



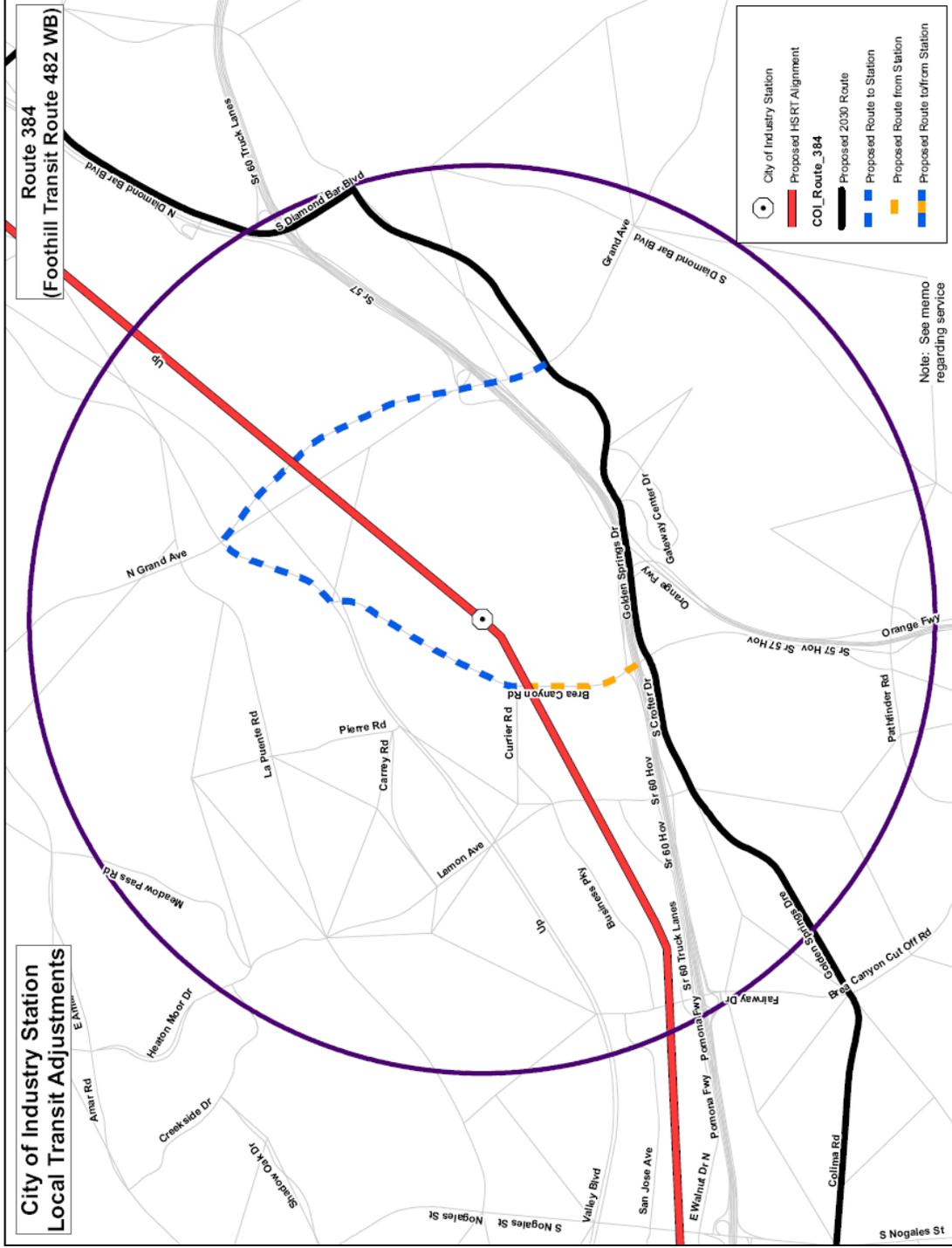
Source: SCAG Regional Travel Demand Model.

Figure 4.55 Adjustment to Foothill Transit Route 179, Westbound



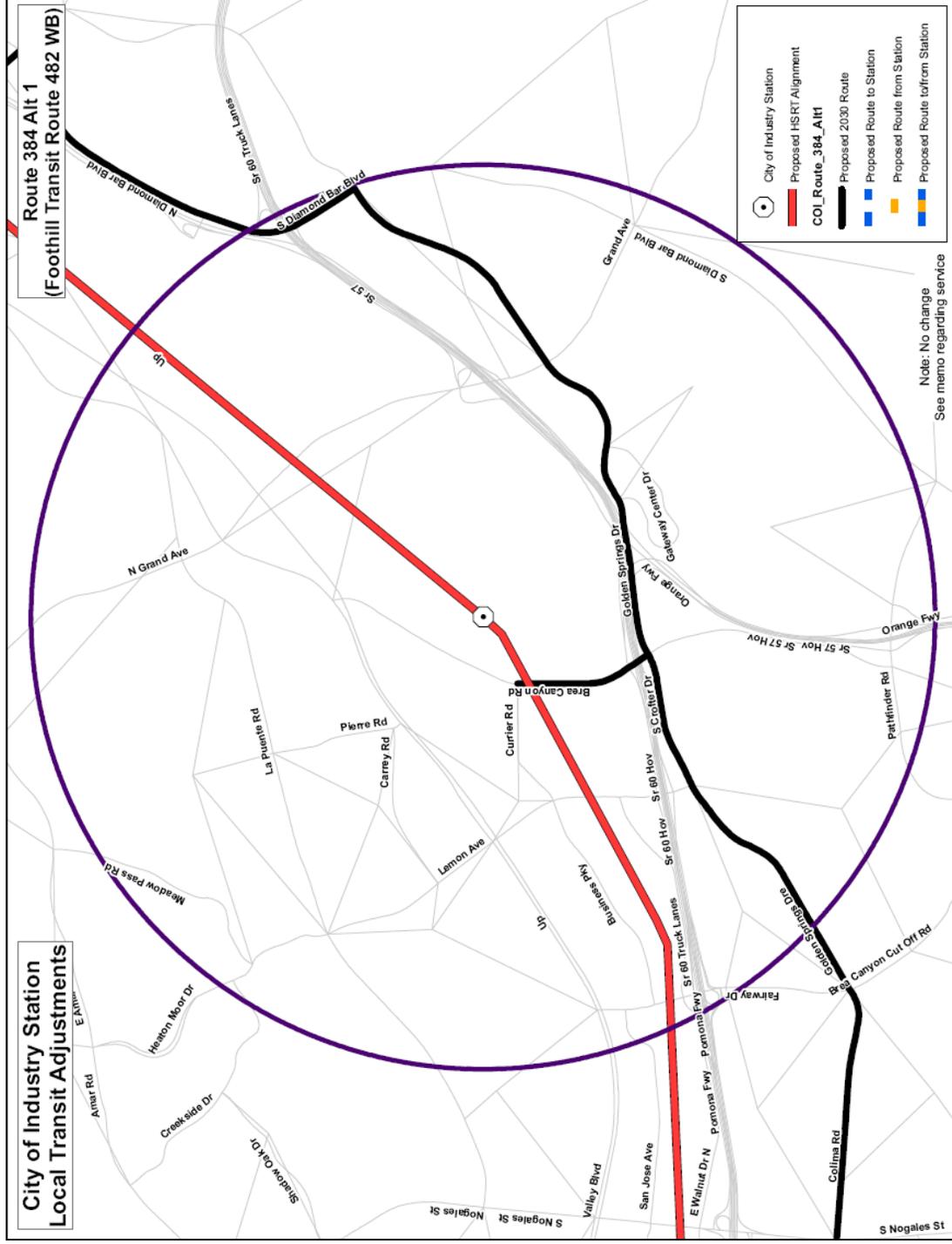
Source: SCAG Regional Travel Demand Model.

Figure 4.56 Adjustment to Foothill Transit Route 482, Westbound



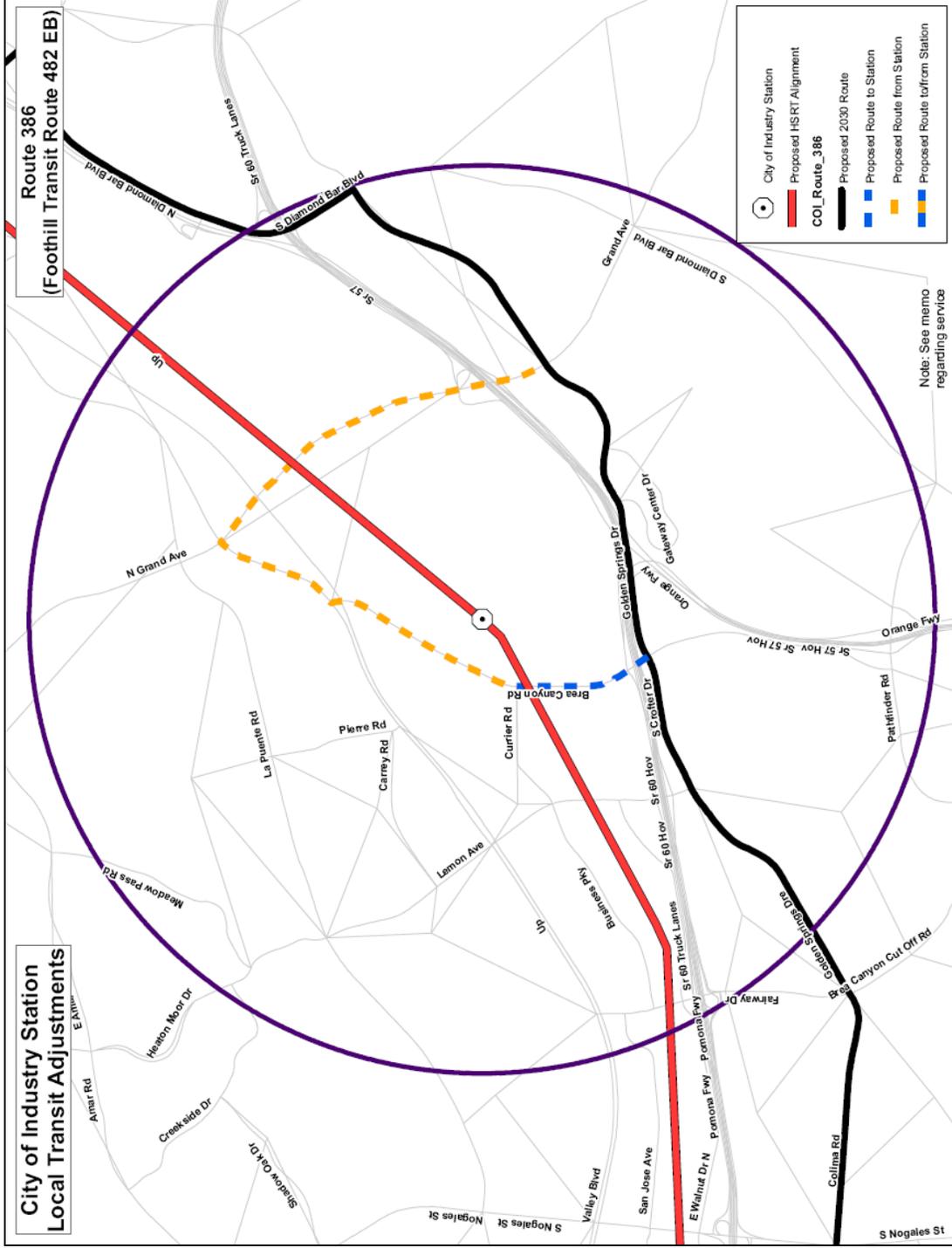
Source: SCAG Regional Travel Demand Model.

Figure 4.57 Adjustment to Foothill Transit Route 482, Westbound



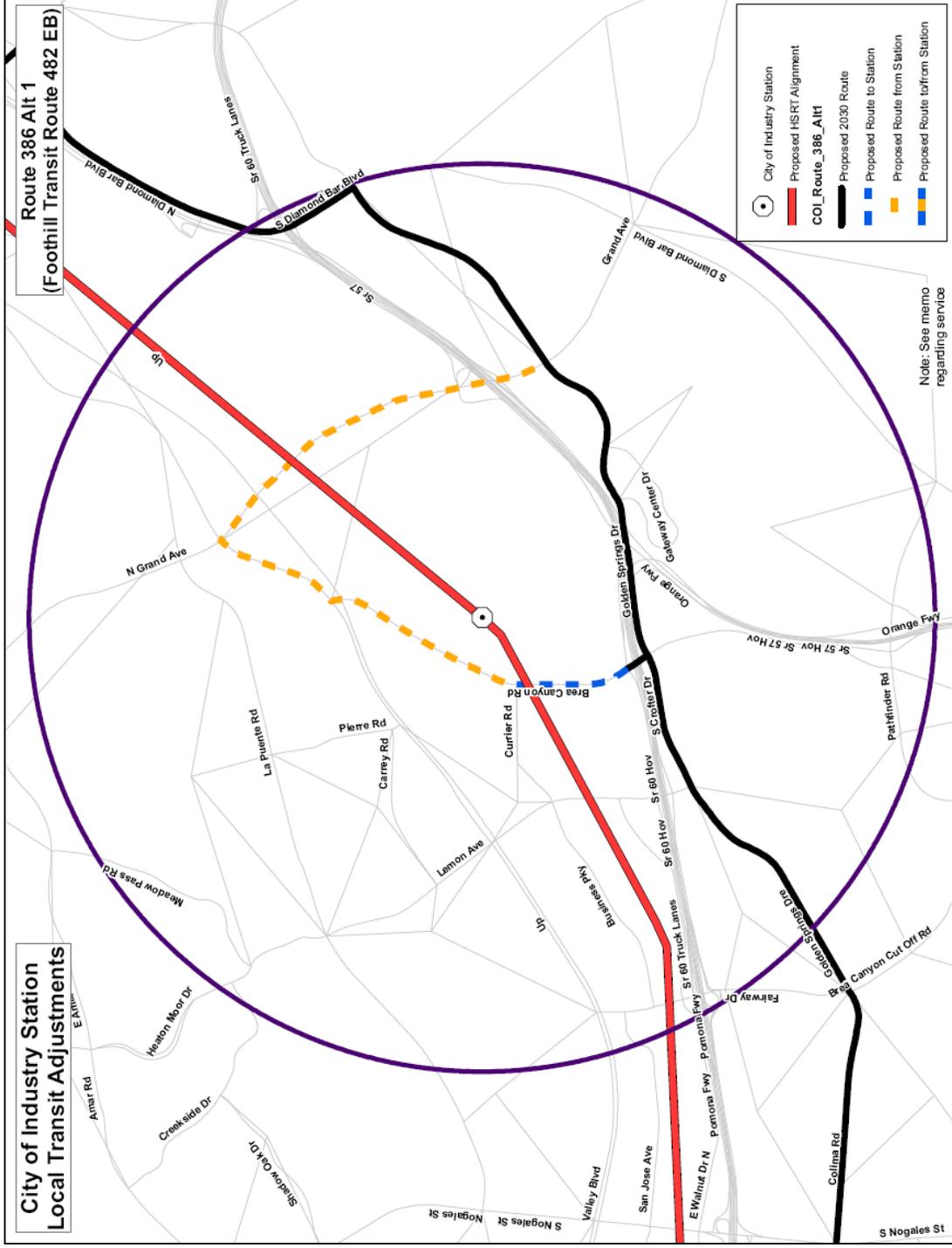
Source: SCAG Regional Travel Demand Model.

Figure 4.58 Adjustment to Foothill Transit Route 482, Eastbound



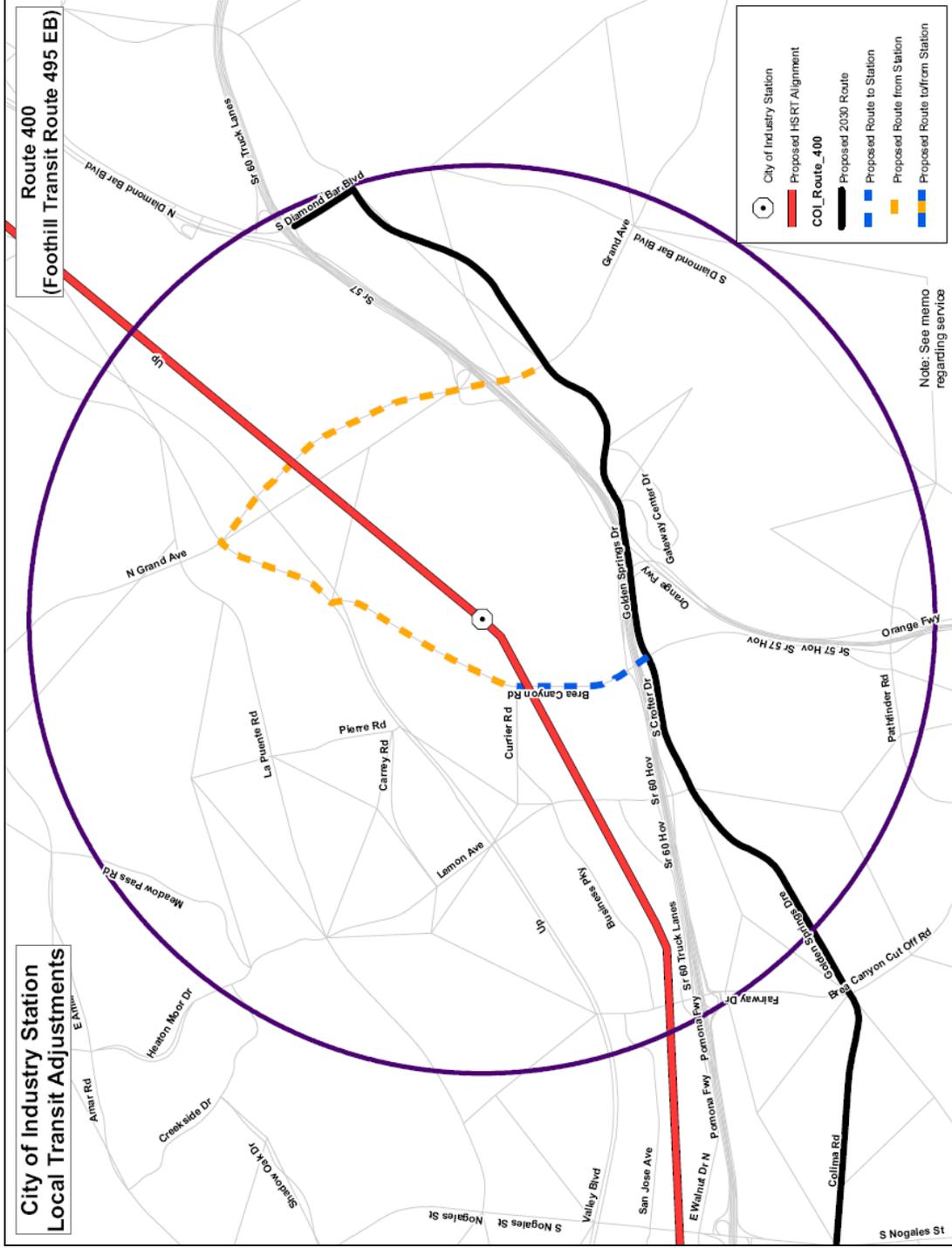
Source: SCAG Regional Travel Demand Model.

Figure 4.59 Adjustment to Foothill Transit Route 482, Eastbound



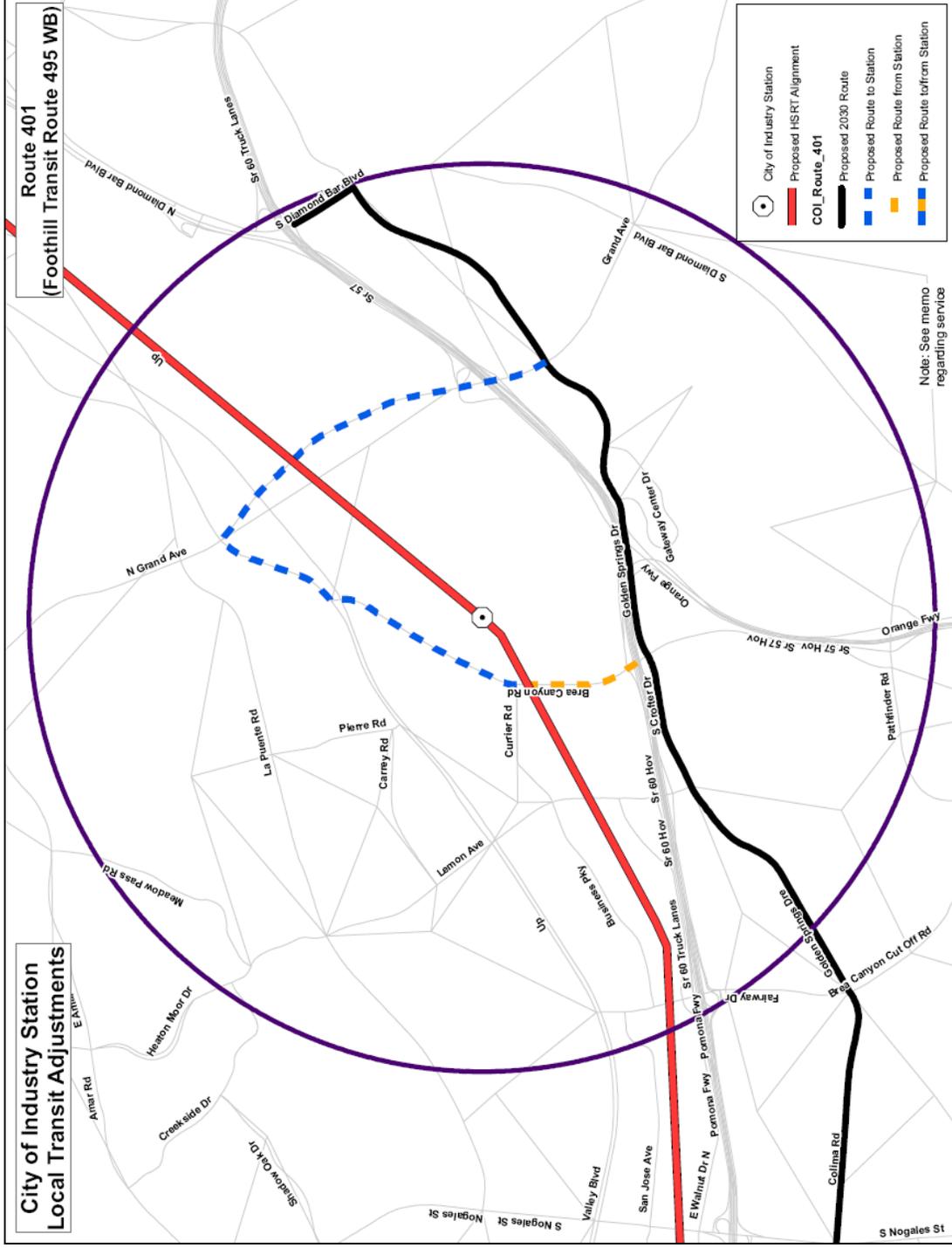
Source: SCAG Regional Travel Demand Model.

Figure 4.60 Adjustment to Foothill Transit Route 495, Eastbound



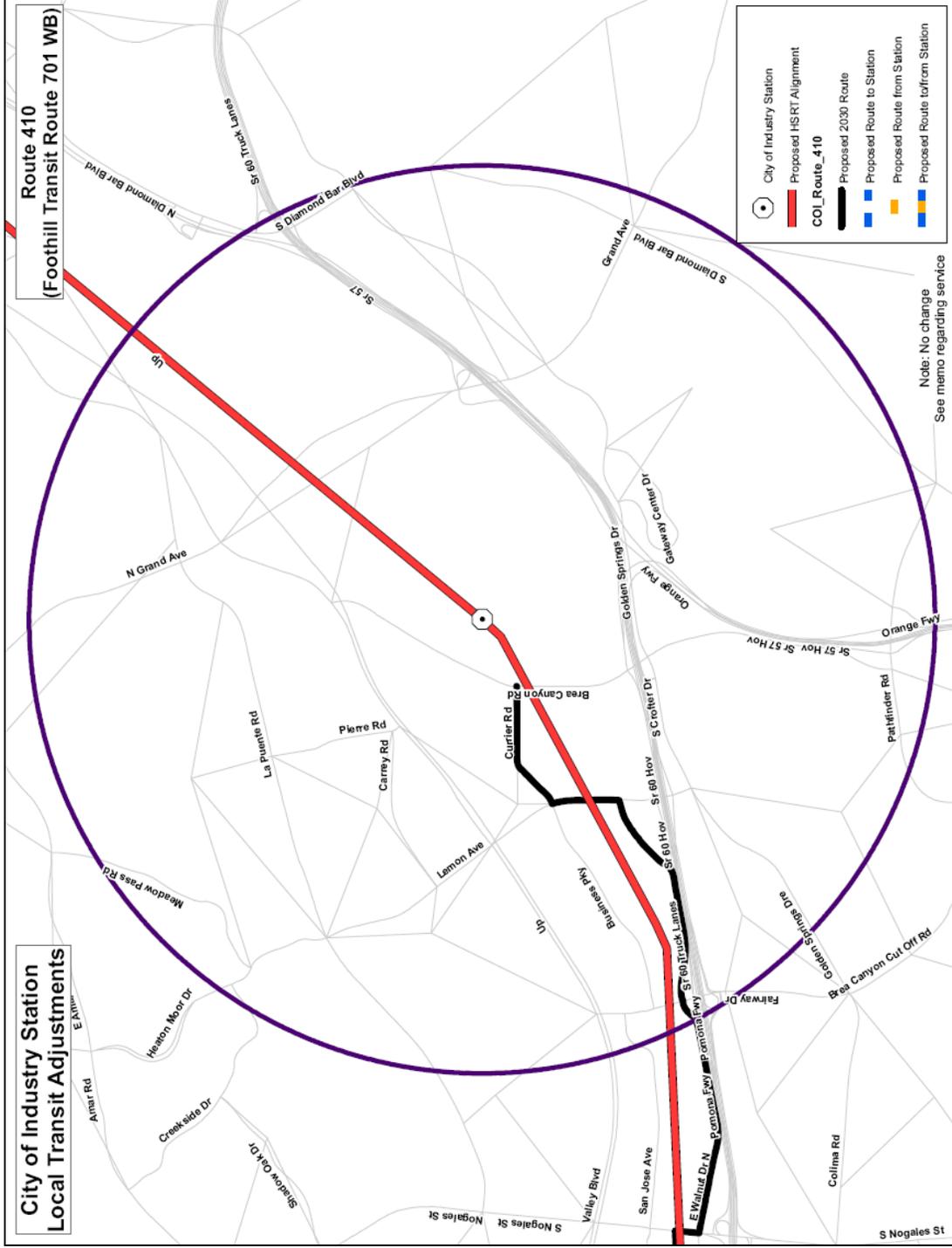
Source: SCAG Regional Travel Demand Model.

Figure 4.61 Adjustment to Foothill Transit Route 495, Westbound



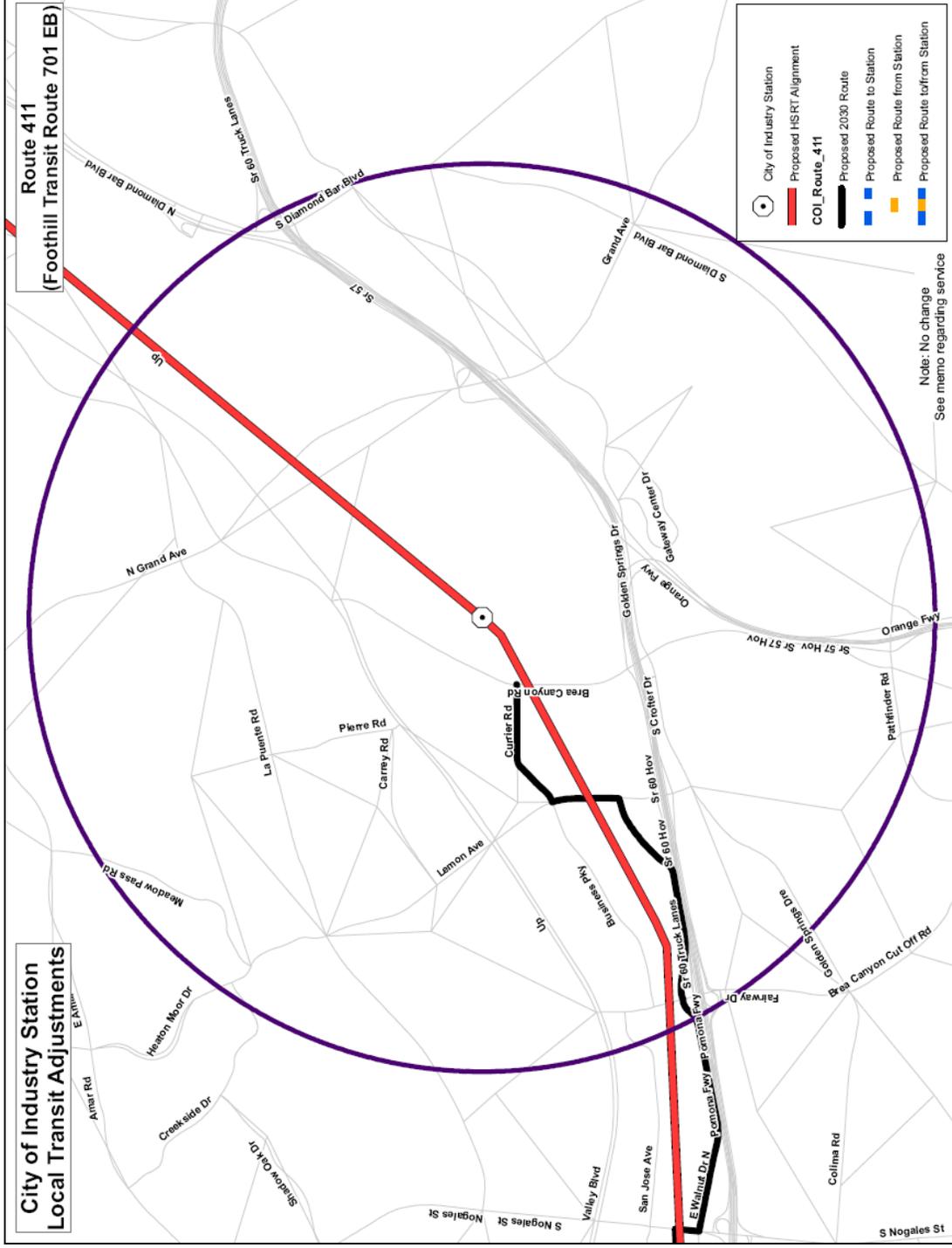
Source: SCAG Regional Travel Demand Model.

Figure 4.62 Adjustment to Foothill Transit Route 701, Westbound



Source: SCAG Regional Travel Demand Model.

Figure 4.63 Adjustment to Foothill Transit Route 701, Eastbound

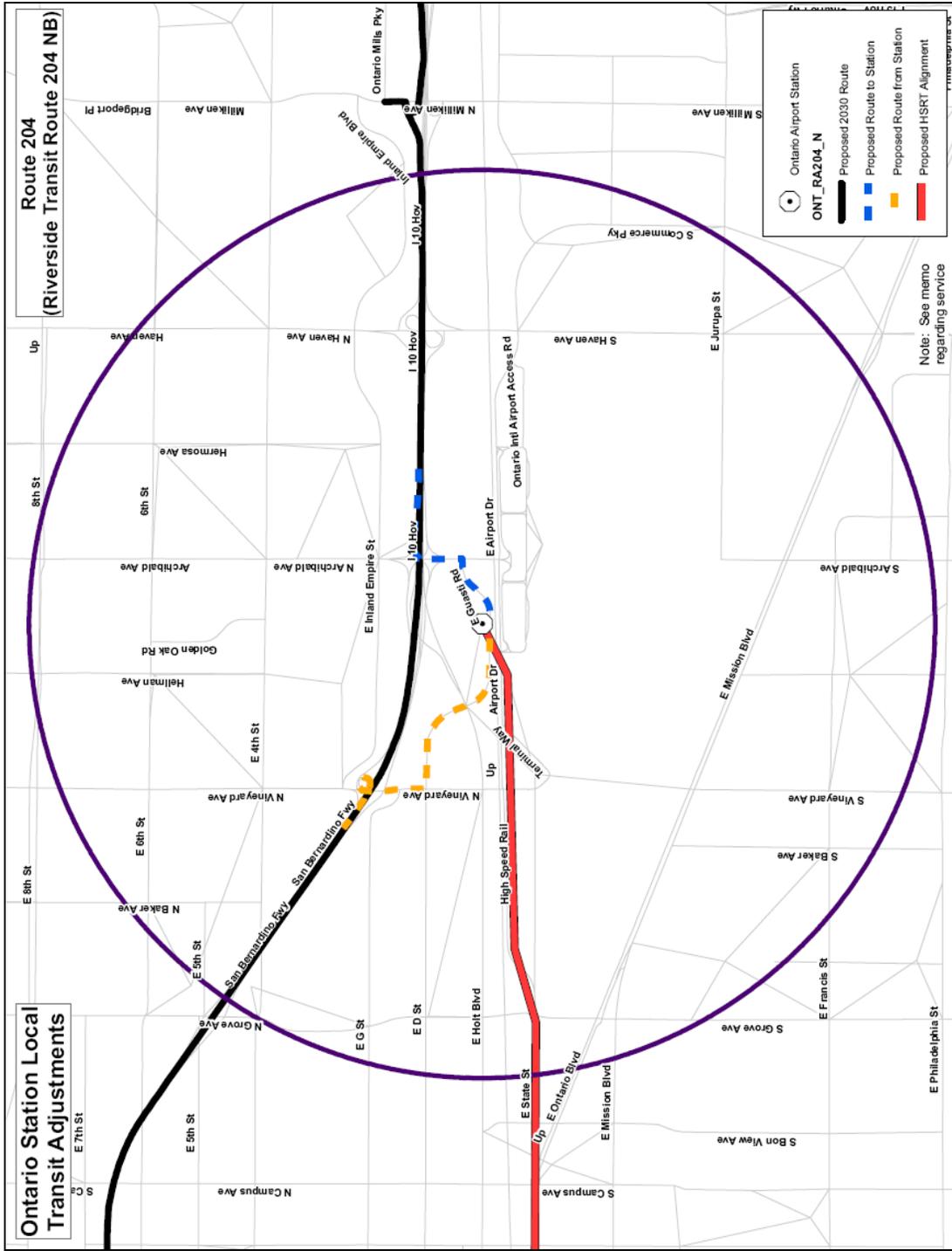


Source: SCAG Regional Travel Demand Model.

## **4.3 ADJUSTMENTS TO LOCAL TRANSIT - ONTARIO AIRPORT**

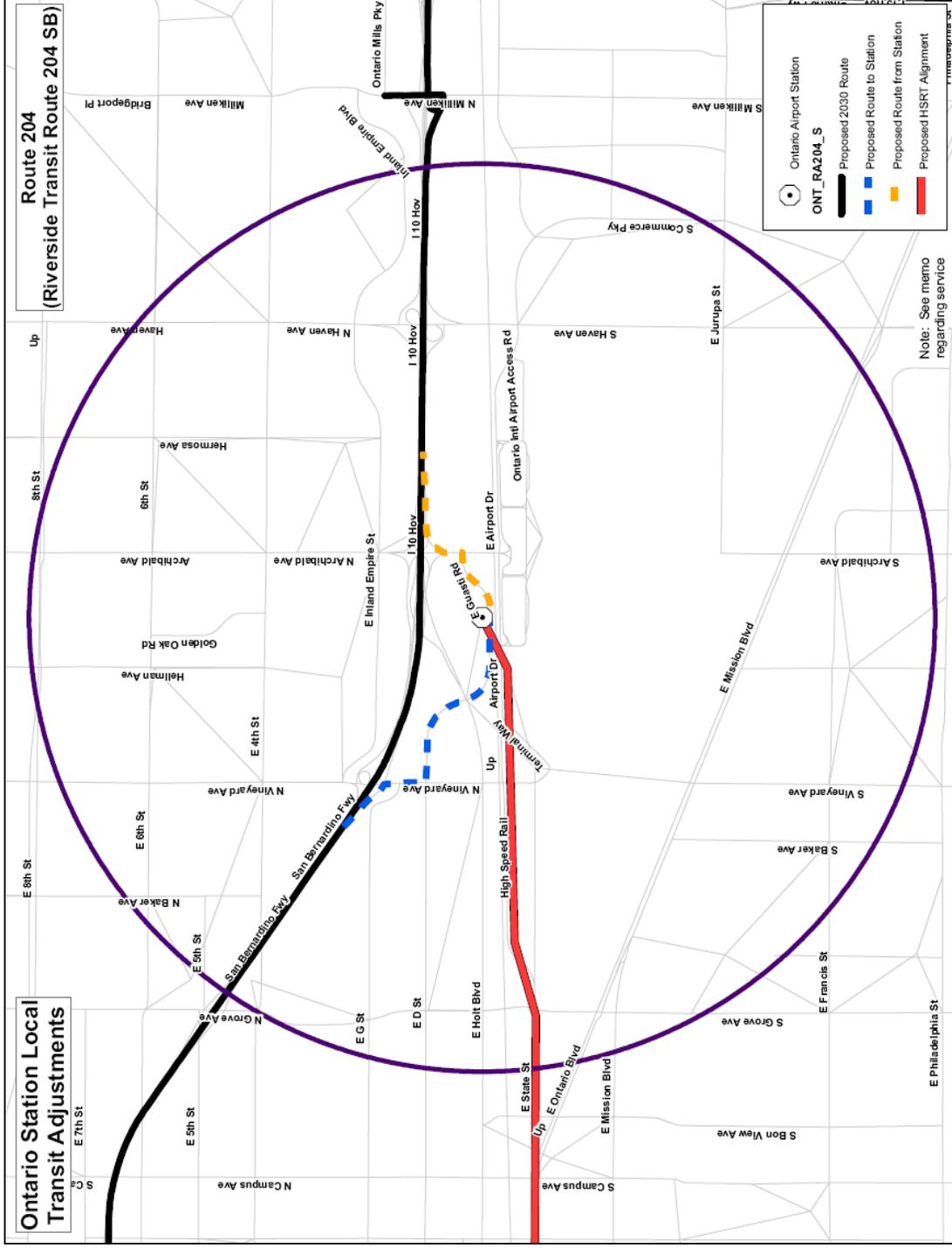
Year 2025 transit routes in the vicinity of the proposed Ontario Airport HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 4.64 to Figure 4.75. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 4.64 Adjustment to Riverside Transit Route 204, Northbound



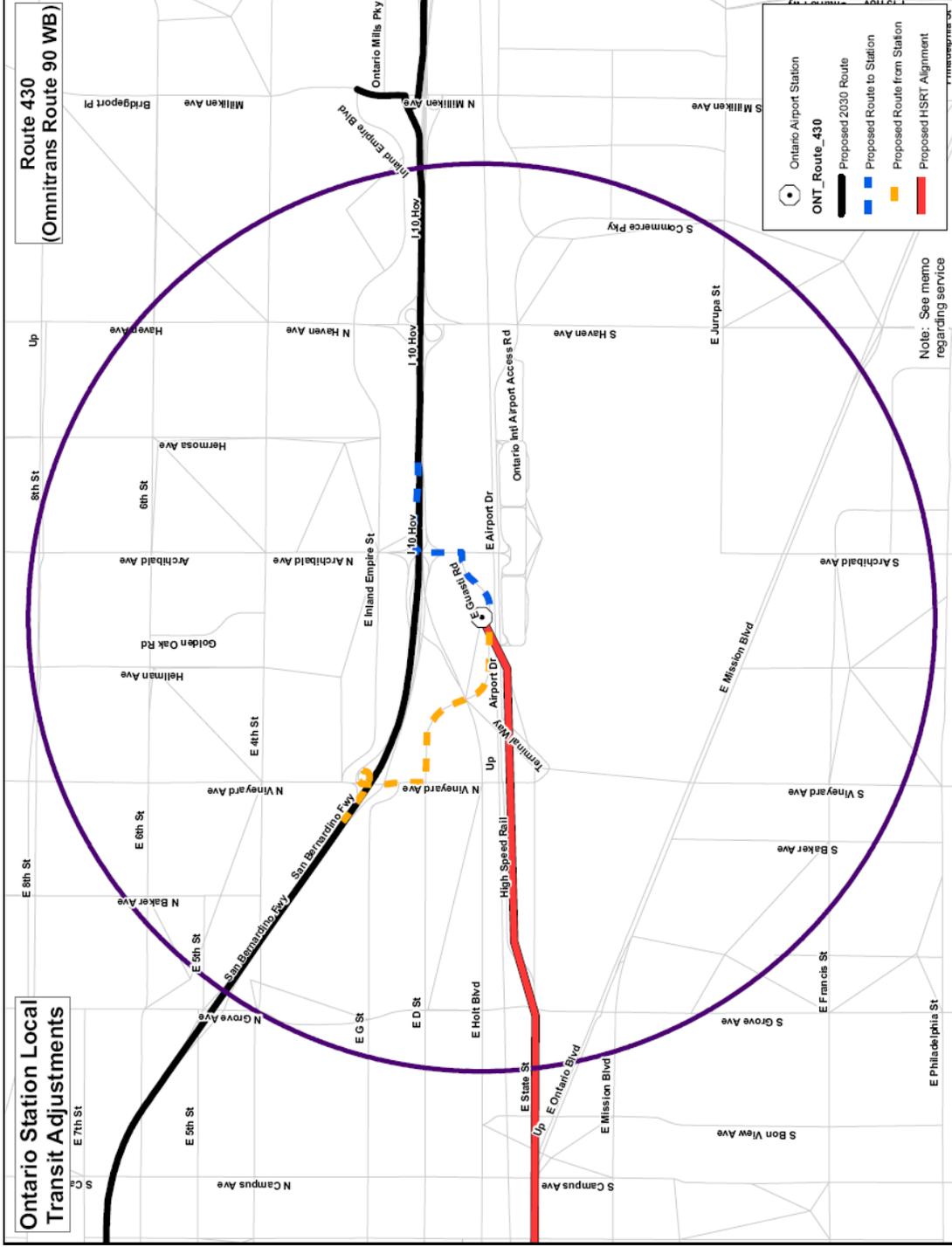
Source: SCAG Regional Travel Demand Model.

Figure 4.65 Adjustment to Riverside Transit Route 204, Southbound



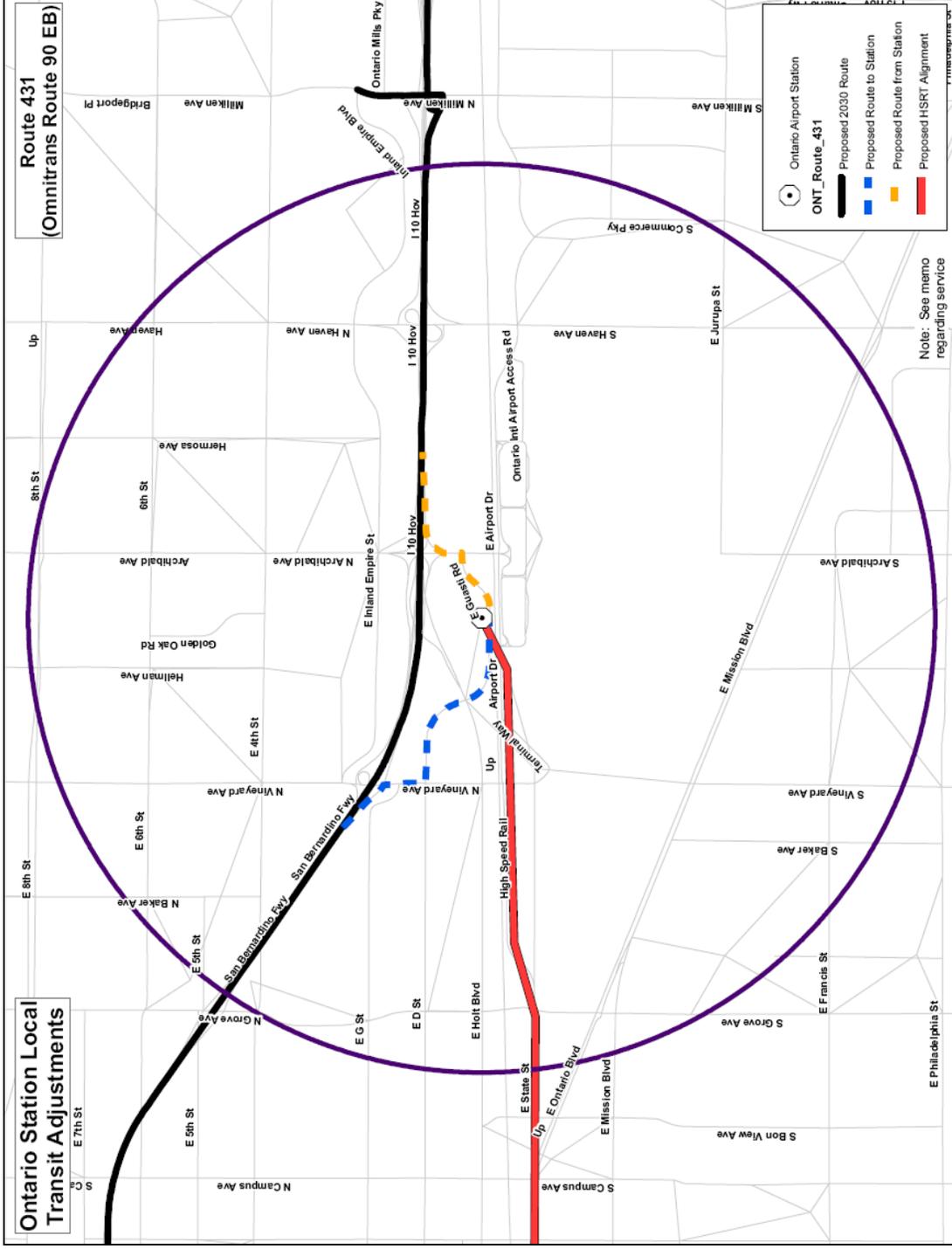
Source: SCAG Regional Travel Demand Model.

Figure 4.66 Adjustment to Omnitrans Route 90, Westbound



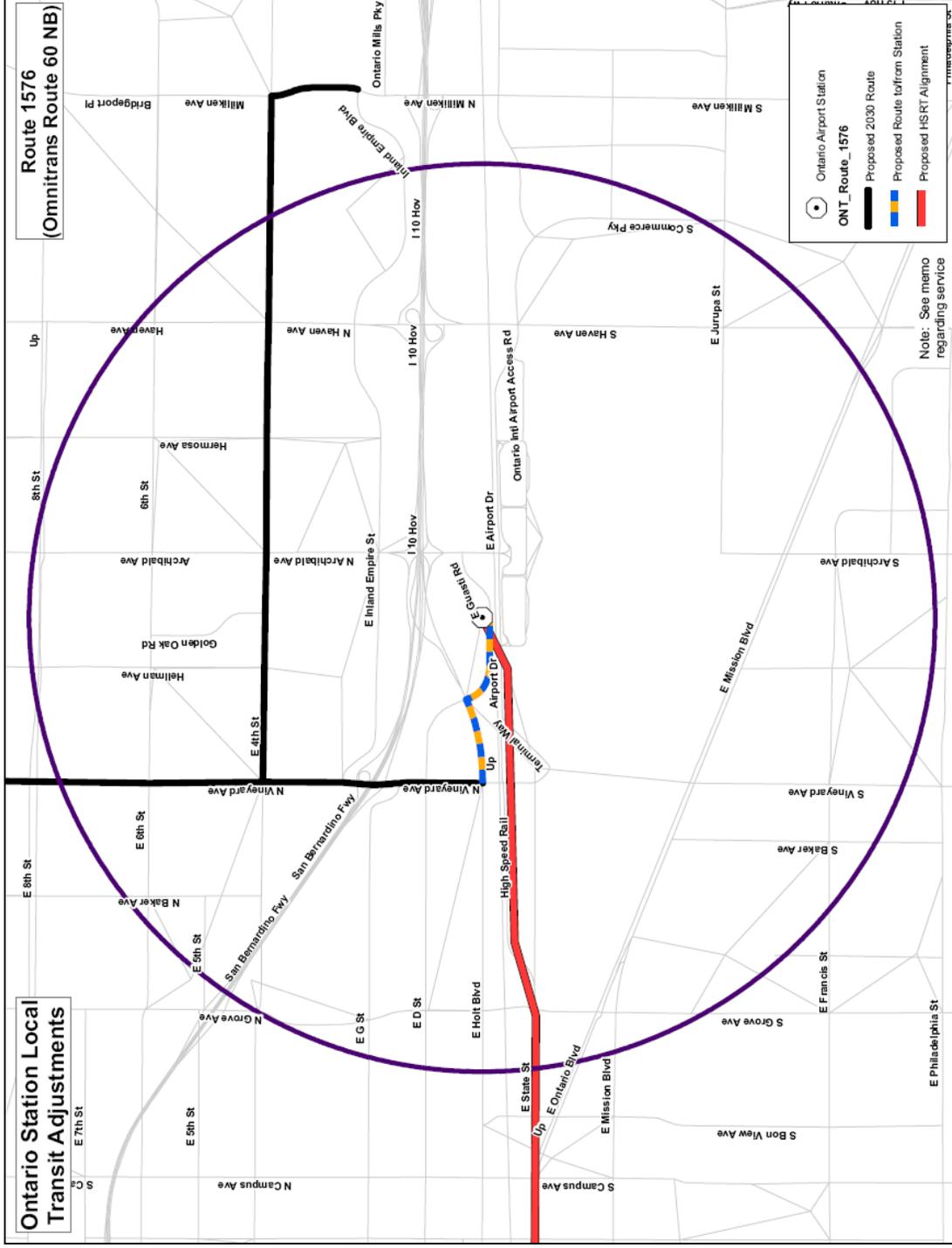
Source: SCAG Regional Travel Demand Model.

Figure 4.67 Adjustment to Omnitrans Route 90, Eastbound



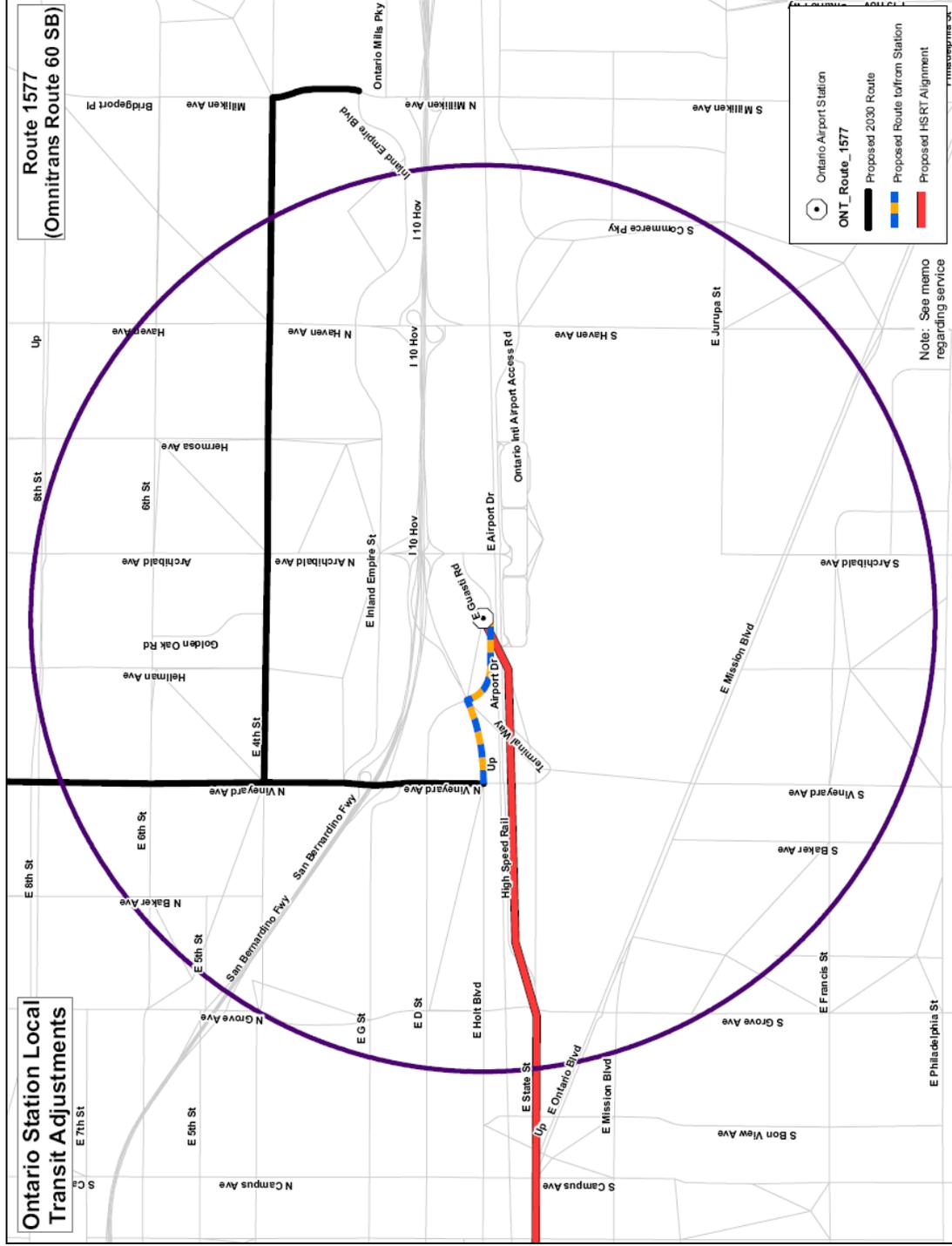
Source: SCAG Regional Travel Demand Model.

Figure 4.68 Adjustment to Omnitrans Route 60, Northbound



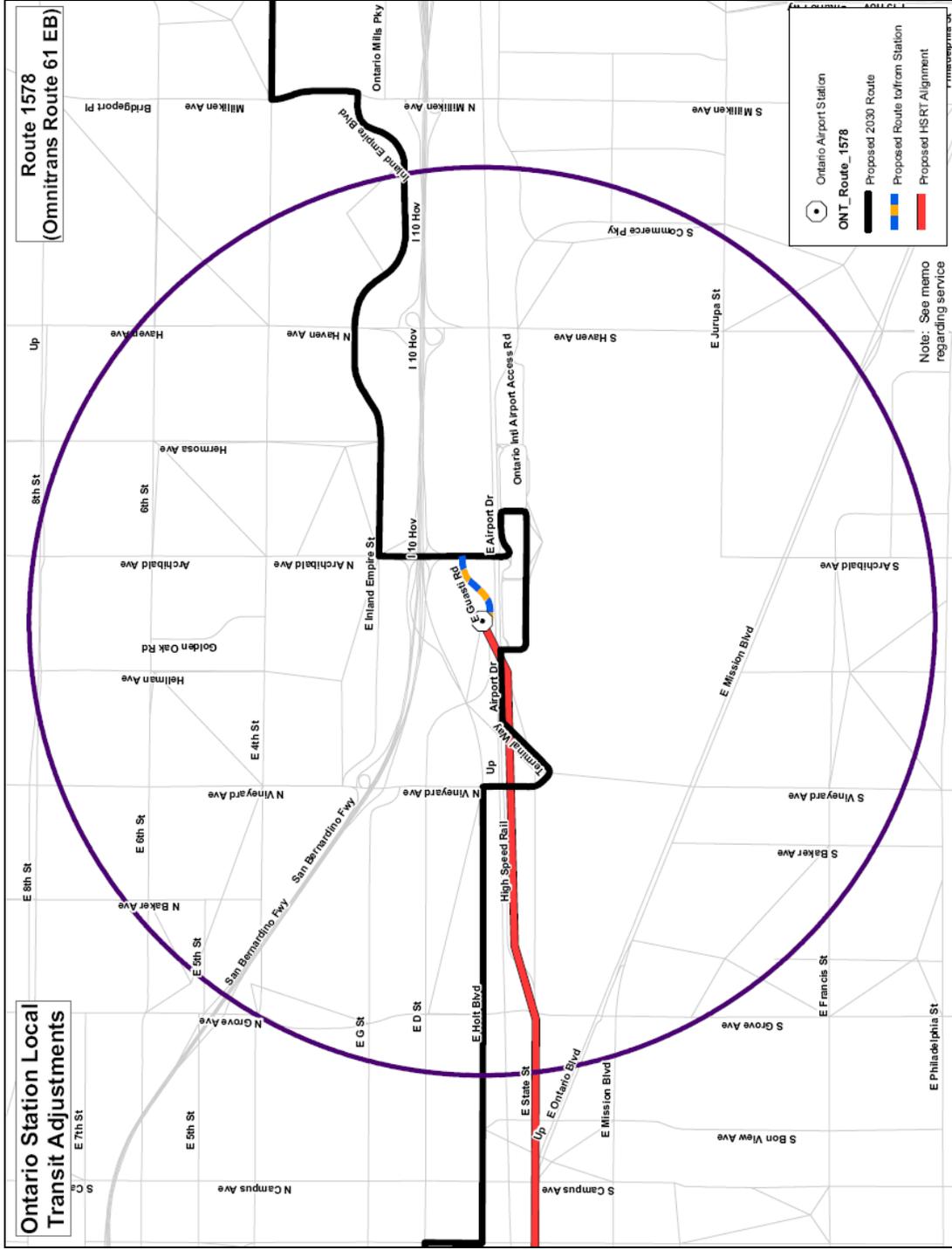
Source: SCAG Regional Travel Demand Model.

Figure 4.69 Adjustment to Omnitrans Route 60, Southbound



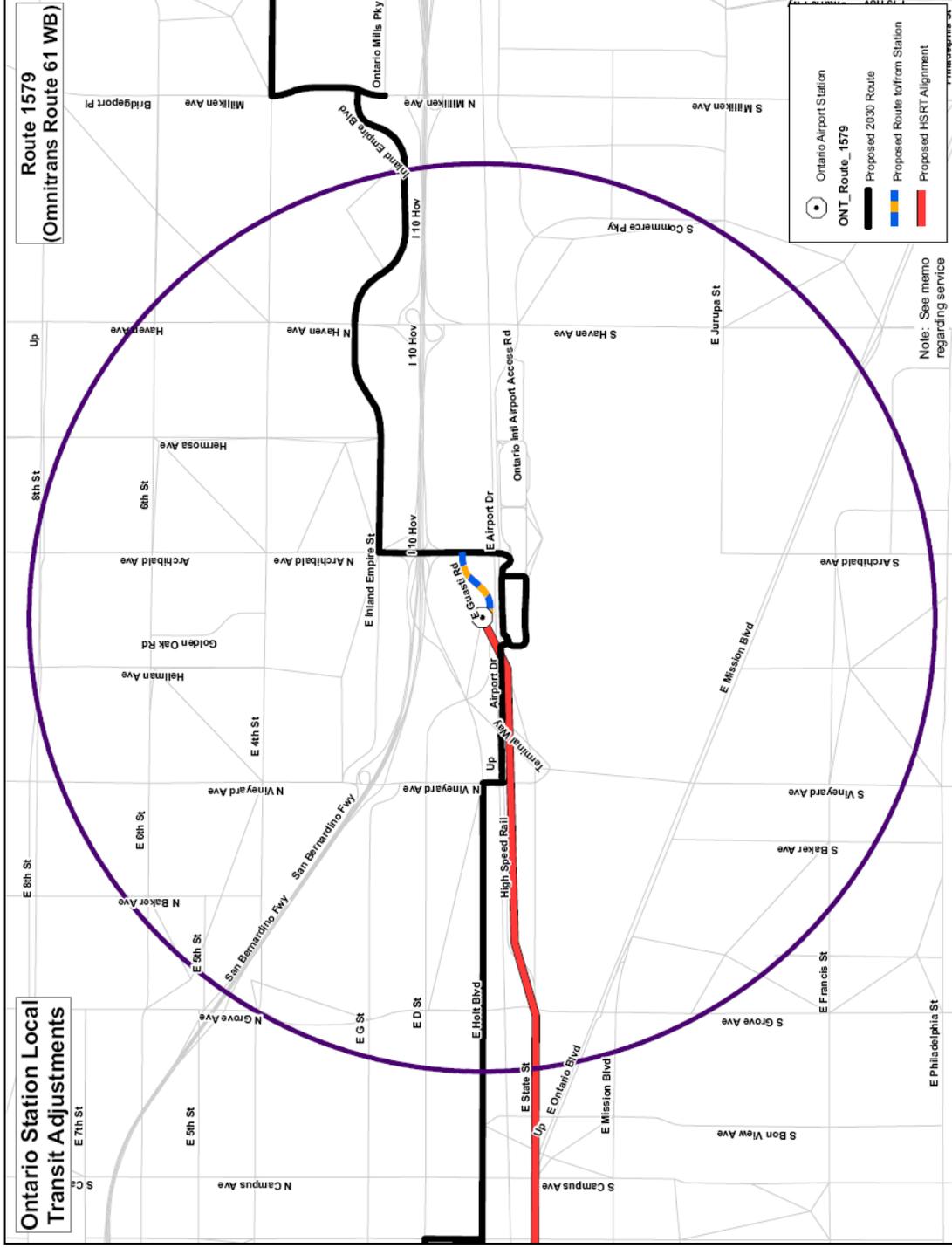
Source: SCAG Regional Travel Demand Model.

Figure 4.70 Adjustment to Omnitrans Route 61, Eastbound



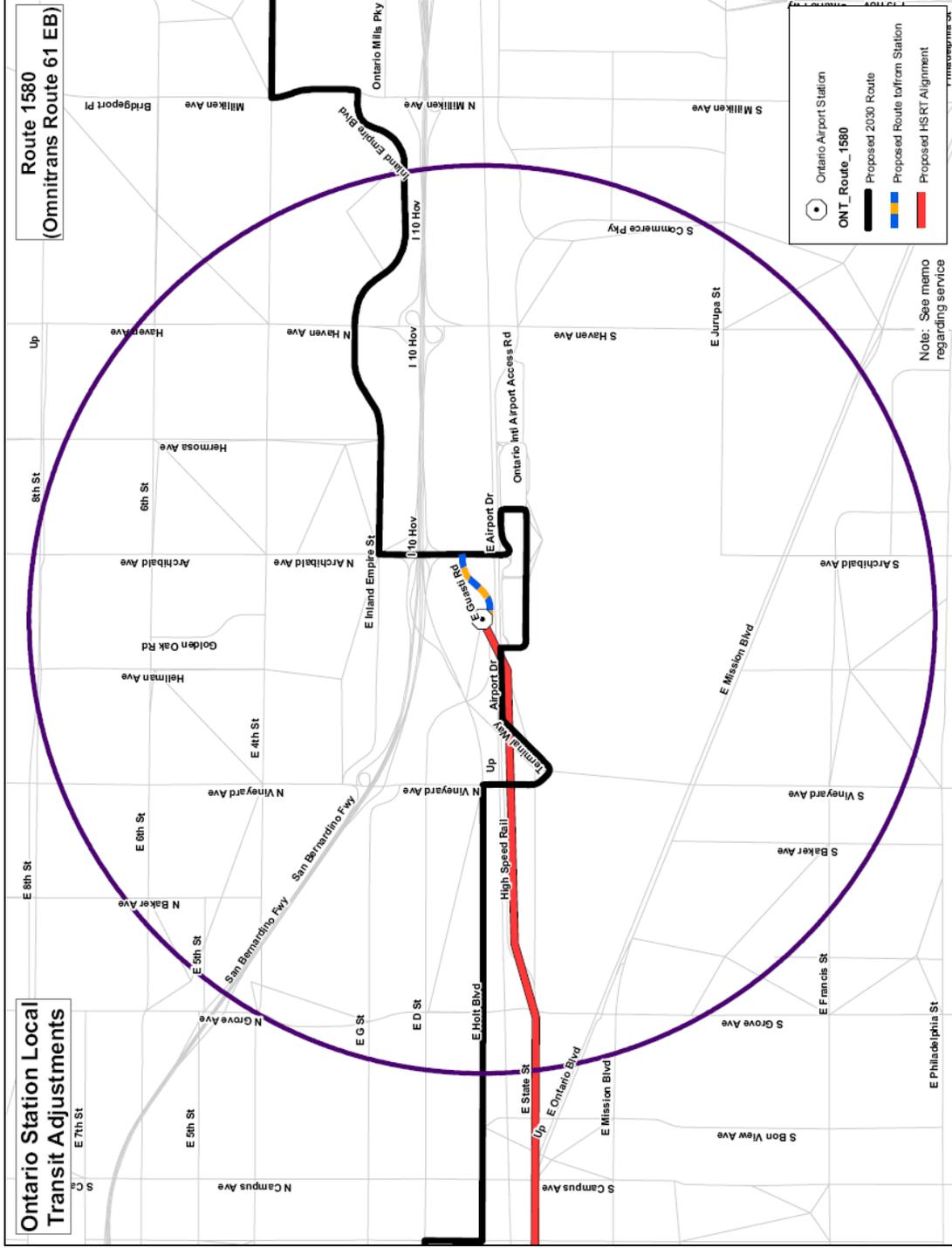
Source: SCAG Regional Travel Demand Model.

Figure 4.71 Adjustment to Omnitrans Route 61, Westbound



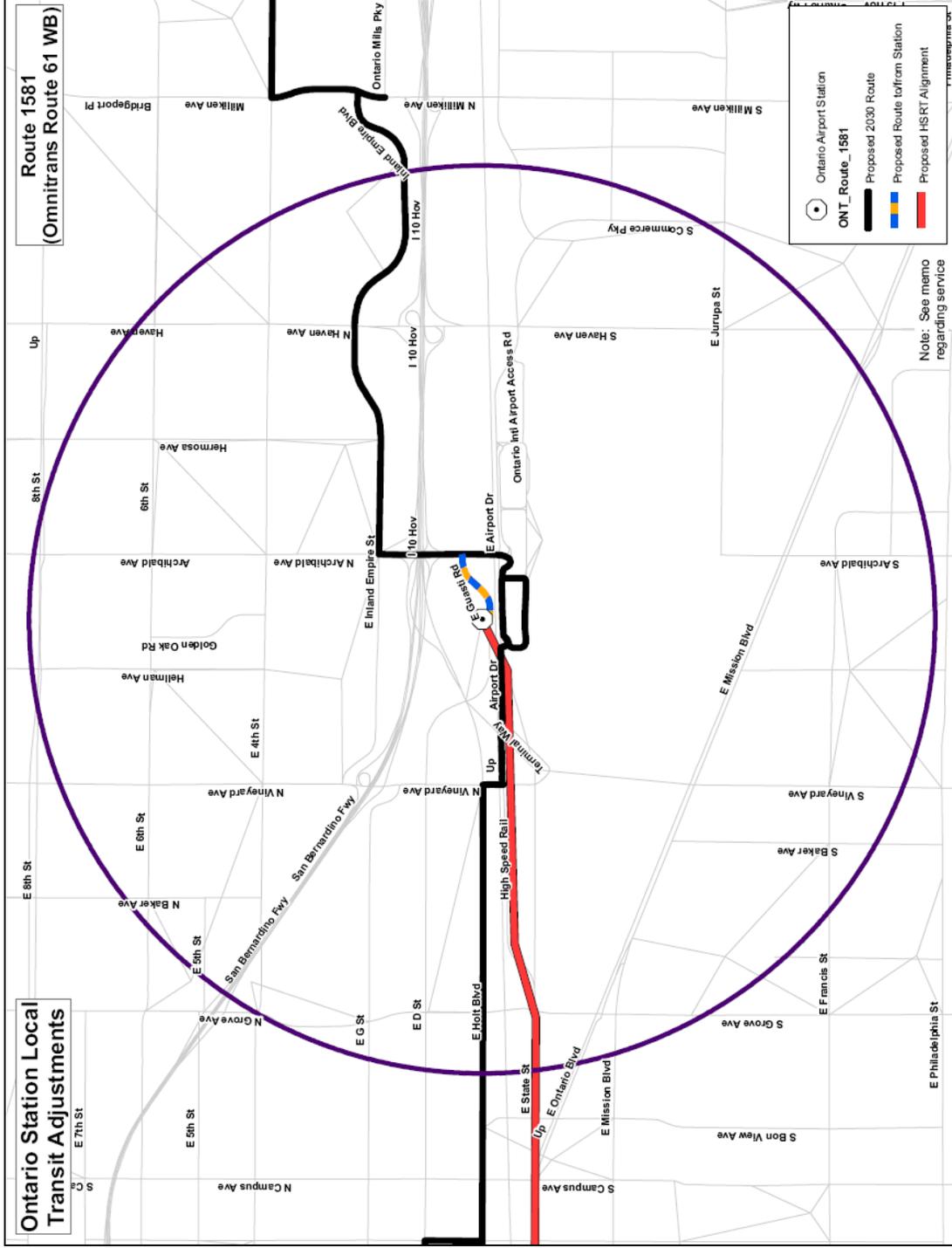
Source: SCAG Regional Travel Demand Model.

Figure 4.72 Adjustment to Omnitrans Route 61, Eastbound



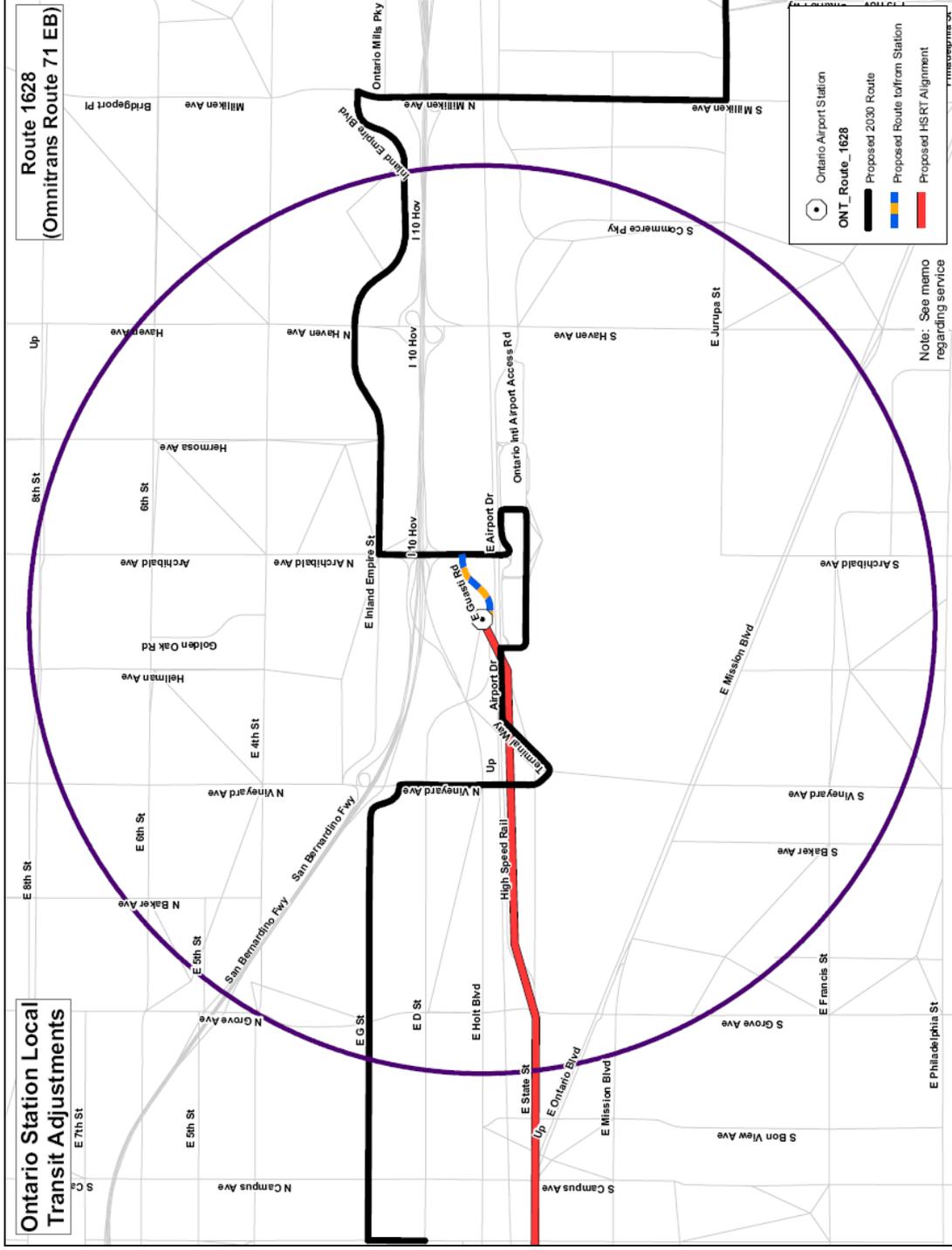
Source: SCAG Regional Travel Demand Model.

Figure 4.73 Adjustment to Omnitrans Route 61, Westbound



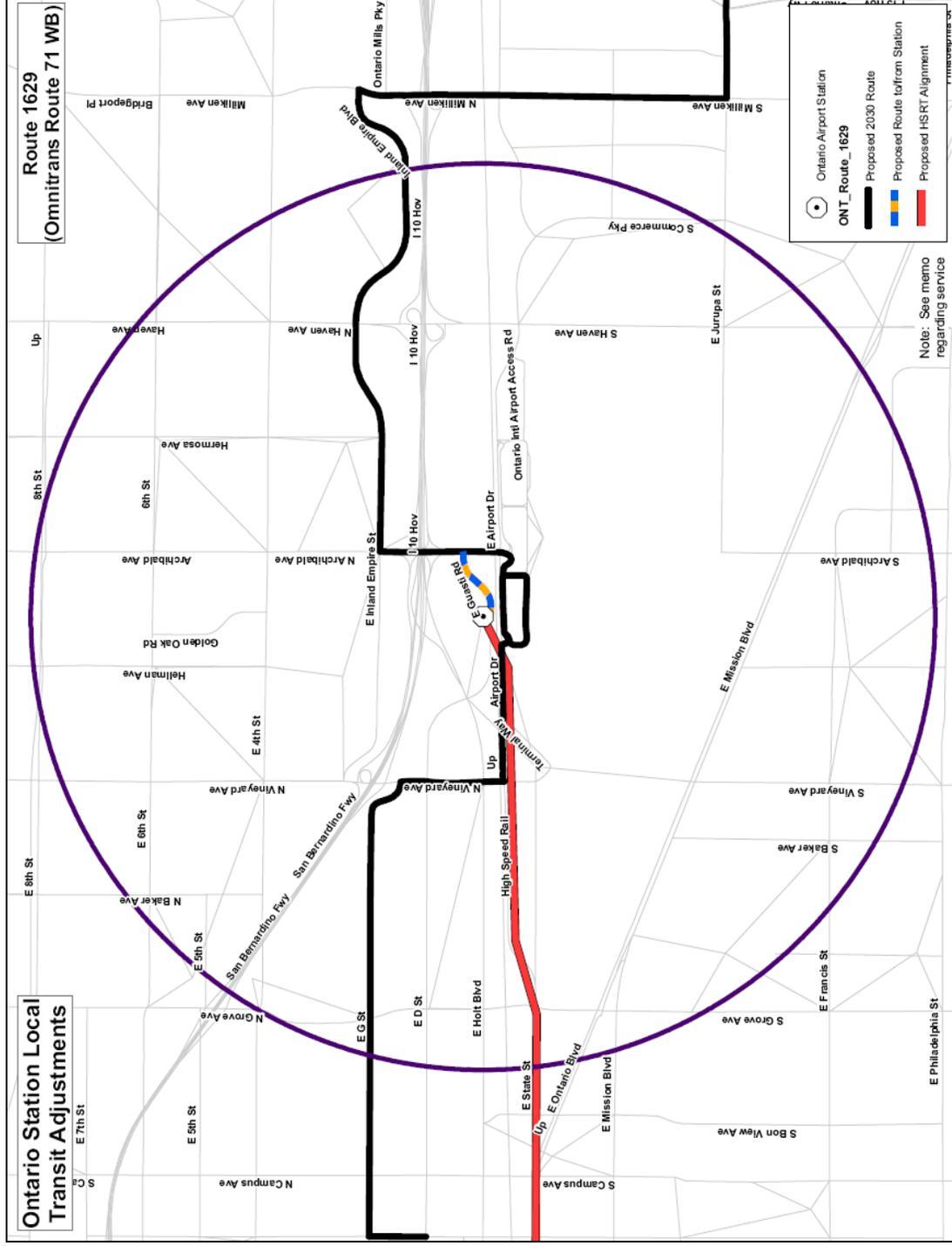
Source: SCAG Regional Travel Demand Model.

Figure 4.74 Adjustment to Omnitrans Route 71, Eastbound



Source: SCAG Regional Travel Demand Model.

Figure 4.75 Adjustment to Omnitrans Route 71, Westbound



Source: SCAG Regional Travel Demand Model.

## 5.0 Comparison With California Maglev Deployment Program Ridership Results

The last analysis of high-speed rail ridership in the IOS corridor was conducted as part of the California Maglev Deployment Program (CMDP). This study was developed by Parsons Transportation Group for the California Business, Transportation and Housing Agency; California High Speed Rail Authority (CHSRA), and the Southern California Association of Governments (SCAG). The CMDP results, shown in this appendix, come from *California Maglev Deployment Program, Preliminary Ridership and Revenue Forecasts, June 2000*.

Prior to the High-Speed Regional Transportation System Alternatives Analysis (HSRT AA), the CMDP ridership analysis had been regarded as the only official forecast for a high-speed rail system in the IOS corridor. Although the HSRT AA Detailed Workplan does not specify that results from the current study be compared or reconciled with the previous study, many stakeholders reviewing this current study (HSRT AA) are likely to make comparisons and have legitimate questions regarding significant differences between the results from the two studies, especially with regard to ridership. Anticipating these questions, this section summarizes the previous study's results and provides some reconciliation.

The CMDP estimated ridership in the year 2020 for a high-speed Maglev system operating from Los Angeles International Airport (LAX) to March Inland Port (formerly March Air Force Base). Five primary alternatives were considered (see Table 5.1). Of these, CMDP Alternative 5 closely matches the HSRT AA Maglev on UPRR Alternative between West Los Angeles (West LA) and Ontario, both having stations at West LA, Los Angeles Union Station (LAUS), City of Industry and Ontario Airport. The CMDP analyzed Alternative 5 under a variety of modeling assumptions. Of these, extensive ridership information was provided for Alternative 5mc. Comparisons of ridership from this point forward therefore compare CMDP Alternative 5mc with the HSRT AA Maglev on UPRR Alternative. It is worth noting that of the CMDP alternatives, Alternative 5mc has the highest ridership.

**Table 5.1 CMDP Station Locations by Alternative**

| Stations           | CMDP Alternative |   |   |   |   |
|--------------------|------------------|---|---|---|---|
|                    | 1                | 2 | 3 | 4 | 5 |
| LAX                | No-Build         | X | X | X | X |
| West LA            |                  |   |   |   | X |
| Union Station      |                  | X | X | X | X |
| West Covina        |                  |   |   | X |   |
| City of Industry   |                  | X |   |   | X |
| Irwindale          |                  |   | X |   |   |
| Ontario Airport    |                  | X | X | X | X |
| Downtown Riverside |                  | X | X | X | X |
| March Inland Port  |                  | X | X | X | X |

## 5.1 DIFFERENCES IN ASSUMPTIONS

The analytical methodology and implementation used by Parsons Transportation Group in its ridership forecast for the CMDP were rigorous and state-of-the-practice. However, several of the operating and modeling assumptions made in the CMDP differ from those in the HSRT AA. Most of the differences in the ridership results between the two studies can be explained with a careful comparison of the two set of assumptions. This section presents this comparison by systematically deconstructing the previous CMDP ridership forecast.

Table 5.2 summarizes the key differences in operating and modeling assumptions between the HSRT AA and the CMDP. See Section 6.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009* for a more complete discussion of the travel time assumptions used in the HSRT AA. See Section 8.2 regarding the assumptions for the other operating parameters. See Section 7.0 regarding Smart Shuttles. See Section 8.1, Travel Demand Models, regarding the high-speed rail modal constant.

**Table 5.2 Key Differences Between HSRT AA and CMDP Ridership Analyses**

| Stations                                 | HSRT AA<br>Maglev on UPRR                                  | CMDP<br>Alternative 5mc   |
|--|--|---|
|  | West LA, LAUS,<br>City of Industry, Ontario                | LAX, West LA, LAUS,<br>City of Industry, Ontario,<br>Riverside, March |
| Travel Time (West LA to Ontario)         | 33 minutes   | 37 minutes*   |
| Peak Fares (2007\$)                      | \$10.91-\$13.36, average \$11.90                           | \$12.34-19.40, average \$14.70  |
| Off-peak Fares (2007\$)                  | Same as above  | \$9.47-15.77, average \$11.60   |
| Peak Headway                             | 15 min   | 5 min   |
| Off-peak Headway                         | 20 min   | 10 min  |
| Parking Cost                             | \$10.60 at LA Union Station,**<br>\$2.50 at other stations | Free  |
| Time from Parked Car to Station Platform | 4 min at LA Union Station,**<br>5 min at other stations    | 1 minute  |
| Smart Shuttles                           | No   | Yes   |
| High-Speed Rail Modal Constant           | Same as Commuter Rail                                      | Higher than Commuter Rail   |

\*From the Lockheed Martin – IBI Final Milestone 2 Report, July 2003.

\*\*Value from SCAG Regional Travel Demand Model.

## 5.2 COMPARING RIDERSHIP RESULTS

For Alternative 5mc, the CMDP forecast 91,570 boardings per day in 2020. However, this figure includes stations at LAX, Downtown Riverside, and March Inland Port – stations which are not included in the HSRT AA Maglev on UPRR Alternative. Table 6-8, page 6-25 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000*, shows projected ridership by station-to-station pair. Using this table, we could remove the effects of LAX, Downtown Riverside, and March Inland Port. Doing so results in a forecast of 40,780 boardings per day in 2020.

The CMDP also tested the ridership impact of various sensitivities (see pages 6-8 to 6-10 and Table 6-4 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000*):

1. Using the same modal constant for high-speed rail as commuter rail rather than an improved one reduces daily ridership by 35 percent;
2. Adding a \$5.00 parking cost (1989 dollars) at all stations reduces daily ridership by 31 percent;
3. Removing Smart Shuttles reduces daily ridership by nine percent;

4. Increasing the time to walk from a parked car to the station from 1 minute to 5 minutes reduces daily ridership by 18 percent; and
5. Decreasing train frequency to three per hour reduces daily ridership by 19 percent.

To estimate the ridership impact on CMDP results of imposing a \$2.50 parking cost rather than \$5.00, we reduced the parking reduction percent by 50 percent, to 16 percent.

Combining all of the above sensitivities together results in a set of operating and model assumptions that are much more similar to those made for the HSRT AA. The result of this exercise is shown in Table 5.3, and results in CMDP average daily ridership in 2020 for Alternative 5mc of 13,520, about 15 percent higher than the HSRT AA year 2035 forecast for the Maglev on UPRR Alternative. It is important to note that the CMDP did not conduct a sensitivity test with all of the above sensitivity scenarios combined. If they had done such a test, it may likely have resulted in ridership figures different from those shown in Table 5.3. However, the results in Table 5.3 provide a sense of how large the CMDP ridership might have been if it had included all the sensitivity scenarios and thus generated a result more consistent with the HSRT AA assumptions.

**Table 5.3 CMDP Alternative 5mc Ridership Result Adjusted to be More Consistent with HSRT AA**

| Scenario  | CMDP Estimated Ridership Reduction | Resulting Year 2020 Daily Ridership |
|---|------------------------------------|-------------------------------------|
| CMDP Forecast for Alternative 5mc                         |                                    | 91,570                              |
| Remove Riverside, March                                   | -19%                               | 74,490                              |
| Remove LAX  | -45%                               | 40,770                              |
| Reduce frequency to 3 per hour                            | -19%                               | 32,940                              |
| Increase walk time from car to station to 5 minutes       | -18%                               | 27,080                              |
| Add \$2.50 parking cost                                   | -16%                               | 22,850                              |
| Remove Smart Shuttle                                      | -9%                                | 20,790                              |
| High-speed rail has same modal constant as commuter rail  | -35%                               | 13,520                              |
| HSRT AA result for Maglev on UPRR Alternative (year 2035) |                                    | 11,670                              |

Source: Cambridge Systematics analysis using CMDP ridership reduction results for individual scenarios.

Based on this analysis, we conclude that the CMDP results for Alternative 5mc could be made consistent with the HSRT AA results for the Maglev on UPRR Alternative if similar operating and modeling assumptions are made. We note that the two largest impacts on ridership according to the CMDP are removing LAX and setting the high-speed rail modal constant equal to the commuter rail constant.

While the overall CMDP ridership results can be made consistent with the overall HSRT AA results, there are differences for individual ridership components. The HSRT AA ridership forecast is comprised of six potential sources of ridership:

1. Core daily ridership;
2. Air traveler trips;
3. Induced travel;
4. Special attractors;
5. Transfers to California – Nevada Maglev; and
6. Transfers to Intercity California High-Speed Rail System.

The below sections compare CMDP results for Items 2 to 6 above with HSRT AA results.

### **Air Traveler Trips**

Air traveler trips are trips made by air travelers and their companions (i.e., drop-off and pick-up) to and from Ontario Airport. This category does not include trips made by employees working at Ontario Airport – these are covered by core daily ridership.

The CMDP estimates 27 percent of ridership for Alternative 5mc are air travelers (see Table 6-7 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000*). Applying this percentage to the estimated 13,520 total ridership (with operating and modeling assumptions made similar to HSRT AA) results in 3,710 air travelers in 2020. This is approximately 90 percent higher than the 1,890 figure forecast for year 2035 by the HSRT AA for the Maglev on UPRR Alternative. While this percentage difference is large, the magnitude of the difference is small relative to the total ridership forecast, and as a result, does not affect the overall results substantially.

### **Induced Travel**

Induced travel are new trips that people decide to make because the HSRT system is available. For example, some people may decide to make a trip to a concert in Downtown Los Angeles they would not have otherwise.

The CMDP estimates four percent of ridership for Alternative 5mc are induced trips (see Table 6-7 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000*). Applying this percentage to the estimated 13,520 total ridership (with operating and modeling assumptions made similar to HSRT AA) results in 590 induced trips in 2020. This is similar to the HSRT AA result for the Maglev on AA Alternative for year 2035 of 530.

## **Special Attractors**

These are trips to specific attractions that generate visitors episodically during the year (e.g., sporting events, amusement parks, museums, etc.).

The CMDP estimates seven percent of ridership for Alternative 5mc are to special attractors (see Table 6-7 of *Preliminary Ridership and Revenue Forecasts, California Maglev Deployment Program, June 2000*). Applying this percentage to the estimated 13,520 total ridership (with operating and modeling assumptions made similar to HSRT AA) results in 890 special attractor trips in 2020. This is approximately 15 times larger than the 60 figure forecast for year 2035 by the HSRT AA for the Maglev on UPRR Alternative. While this percentage difference is large, the magnitude of the difference is small relative to the total ridership forecast, and as a result, does not affect the overall results substantially. Furthermore, as explained in Section 8.3 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*, we believe an average daily forecast of HSRT trips to special attractors on the order of 100 is reasonable.

## **Transfers to California-Nevada Maglev**

This category accounts for riders using the HSRT to access and transfer to a proposed Maglev system operating between Anaheim and Las Vegas.

The CMDP did not include the California-Nevada Maglev system, so no riders were included in its forecasts for this source of ridership.

## **Transfers to Intercity California High-Speed Rail**

This category accounts for riders using the HSRT to access and transfer to the proposed Phase 1 California High-Speed Rail (CHSR) system operating between Anaheim and Northern California.

The CMDP did not include the California-Nevada Maglev system, so no riders were included in its forecasts for this source of ridership.

## 6.0 Capital Cost – Details

The High-Speed Regional Transportation (HSRT) Alternatives Analysis (AA) evaluates high-speed transportation technologies within the Initial Operating Segment (IOS) corridor from West Los Angeles to Ontario Airport. Four alternatives are evaluated in the study:

1. Maglev on I-10 alignment;
2. Steel-wheel on I-10 alignment;
3. Maglev on Union Pacific Railroad (UPRR) alignment; and
4. Steel-wheel on UPRR alignment.

Further information on the four alternatives may be found in Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. This appendix contains detailed information for the capital cost estimates for the four HSRT IOS alternatives.

Costs were developed using standard design criteria, cross sections and unit prices developed by the California High Speed Rail Authority (CHSRA) for the high-speed steel-wheel mode, and from previous reports prepared for SCAG for the Maglev mode, with reviews for reasonableness performed by SYSTRA. All costs are escalated as needed to year 2008 dollars, and are presented using the Federal Transit Administration's (FTA's) Standard Cost Category (SCC) format. Cost escalation is based on entering revenue service in 2012.

Estimates for hard costs were developed by taking off quantities from the alignment drawings for each of the four alternatives. Unit prices based on typical cross sections developed by previous reports were applied to these quantities. Hard cost items include all components of the system, including structures, track and guide beams, stations, parking, site and utility work, electric traction, signaling, communications and other systems, land, and vehicles. Contingencies were included for all hard cost items. Total capital cost was developed by adding soft costs (e.g., Preliminary Engineering, Final Design, project management, construction management, insurance, and start-up costs) to hard costs.

### 6.1 CAPITAL COSTING ASSUMPTIONS

To calculate capital costs for each of the IOS alternatives, sketch methods appropriate to the sub-conceptual level of engineering were implemented:

- Infrastructure is priced on a per-foot and per-meter basis (for Maglev and steel-wheel, respectively) for each of several broadly defined typical sections (i.e., elevated, at-grade, retained cut, tunnel) that were prepared as part of previous studies. Infrastructure includes track, line structures, signals,

power, and communications. Maglev guideway costs were provided as a lump sum. Per linear foot (lf) costs were derived by dividing by alignment length.

- Stations are based on typical station designs, independent of analysis of individual sites. Both Maglev and steel-wheel technologies are assumed to have stations with 200 meter-long platforms that serve trainsets up to 200 meters in length, as documented in the operating cost estimates, with equivalent passenger amenities and circulation.
- Parking is allocated on a per-space basis systemwide rather than at each station. All parking facilities are assumed to be decked.
- Shop and yard costs are based on storage, inspection and scheduled repair programs prepared as part of previous studies. Both technologies are assumed to have similar storage, inspection and schedule repair functions.
- Land costs are based on per-acre costs of typical sections (i.e., urban, freeway, freight corridor) and sites (i.e., station or yard). Current CHSRA property costs are assumed for both technologies.
- Vehicle costs are based on trainsets needed to operate the proposed operating plan plus a 17 percent spare ratio.

All cost values are escalated to 2008 dollars using RS Means Historical Construction Cost Index (January 2008).

## 6.2 SOURCES OF UNIT PRICE INFORMATION

Cost information was drawn from the several sources:

- Refined Cost Estimates, 2006, SCAG Maglev Deployment Program (IBI Group) (SC-RCE);
- Conceptual Design of Stations and Maintenance Facility Technical Report 2006, SCAG Maglev Deployment Program (IBI Group) (SC-CDS);
- CHSRA High Speed Train Unit Costs, 2006 (CA-HUC) is the source of unit costs for high-speed rail specific infrastructure and vehicles;
- Conceptual Construction Cost Estimate, Storage Yard and Maintenance Facilities, California High Speed Train EIR/EIS 2003 (Parsons Brinckerhoff) (CA-EIR); and
- Heavy maintenance facility costs are based on an analysis of typical CHSRA facilities (in particular the California Central Valley) from CA-EIR.

Table 6.1 presents the unit costs for Maglev and steel-wheel technologies. Also listed are the specific sources for each unit cost.

**Table 6.1 Capital Cost Unit Costs and Sources**

| FTA SCC Category | Item   | Steel-Wheel     | Maglev                                      | Sources/Assumptions  |
|------------------|--|-----------------|---|--|
| 10.04            | Elevated Guideway                                  | \$4,500/lf      | \$4,500/lf                                  | CA-HUC for steel-wheel, SC-RCE; SC-GCE, average cost of structural cross-sections for Maglev.  |
| 10.04            | Elevated – additive for high structure             | \$900/lf        | N/A   | CA-HUC for steel-wheel; high structure cost not called out for Maglev.   |
| 10.04            | Elevated – additive for long structure             | \$7,800/lf      | \$4,000/lf                                  | CA-HUC for steel-wheel, SC-RCE; SC-GCE, includes cost of additional superstructure needed for Type 4/5 structures.   |
| 10.04            | Elevated – additive for very high (>60') structure | \$2,700/lf      | N/A   | SYSTRA estimate, applies to steel-wheel on I-10 alignment crossings only.  |
| 10.09            | Track  | \$305/lf        | \$2,100/lf (Type 1);<br>\$1,300/lf (Type 3) | Steel-wheel – direct fixation on structure – CH-HUC; Maglev – Guideway Beams; and SC-RCE; SC-GCE.  |
| 20.02            | Elevated Center                                    | \$47.2 million  | \$47.2 million                              | Based on center platform station design described in SC-CDS – both modes.  |
| 20.02            | Elevated – Center/Side with Mezz.                  | \$85.8 million  | \$85.8 million                              | Based on center-side platform station design described in SC-CDS – both modes; price from SC-RCE includes walkway allowance.   |
| 20.06            | Decked parking                                     | \$20,475/sp     | \$20,475/sp                                 | SC-RCE; SC-CDS.  |
| 30.02            | HSR Shop and Yard                                  | \$156.8 million | \$204.4 million                             | CA-EIR.  |
| 40.02            | Utility Relocation                                 | \$1,100/lf      |   | SC-RCE.  |
| 40.04            | Environmental Mitigation                           | 3%              | 3%  | SC-RCE, CA-HUC.  |
| 40.07            | Roadway on ROW                                     | \$990/lf        | \$990                                       | SC-RCE.  |
| 40.08            | MPT  | \$228/lf        | \$228                                       | SC-RCE.  |
| 50.01            | Signaling  | \$293/lf        | \$293/lf                                    | CA-HUC.  |
| 50.03            | Traction Power Supply                              | \$141/lf        | \$2,103/lf                                  | CA-HUC and SC-RCE, respectively. Maglev cost includes supply and distribution.   |
| 50.04            | Traction Power Distribution                        | \$262/lf        | See 50.03                                   | CA-HUC.  |
| 50.05            | Communications                                     | \$228/lf        | \$228/lf                                    | Fiber backbone is included; CA-HUC – both modes.   |
| 60.01            | Property for stations and yards                    | \$20/sf         | \$20/sf                                     | CA-HUC, used average cost for urban/suburban location.   |
| 60.01            | Property for ROW – Urban                           | \$1,020/lf      | \$1,020/lf                                  | CA-HUC was used for property costs and definitions of locations (Urban, Dense Urban, Freight and Freeway); based on 50' right-of-way for steel-wheel and 52' for Maglev. |
| 60.01            | Property for ROW – Dense Urban (2x Urban)          | \$2,040/lf      | \$2,122/lf                                  |  |
| 60.01            | Property for ROW – Freeway (0.5x Urban)            | \$510/lf        | \$530/lf                                    |  |

| FTA SCC Category | Item                                    | Steel-Wheel                 | Maglev                        | Sources/Assumptions  |
|------------------|---|-----------------------------|-------------------------------|--|
| 60.01            | Property for ROW – Freight (0.5x Urban) | \$510/lf                    | \$530/lf                      |  |
| 70.03            | Trainsets                               | \$30 million/6-car trainset | \$64.1 million/6-car trainset | CA-HUC and SC-RCE, respectively.   |
| 80.01-80.08      | All categories                          | 30%                         | 30%                           | SC-RCE – both technologies   |
| 90.01            | Unallocated                             | 0                           |                               | All contingencies are allocated. Allocated contingencies are 25% for all items, except vehicles and track/guide beams, which are 10%. This amounts to overall contingencies of 17.9% for steel-wheel and 19.7% for Maglev. |

### 6.3 CAPITAL COSTS IN FTA SCC FORMAT

The following pages show the capital costs for each of the four HSRT IOS alternatives in FTA SCC format.

| MAIN WORKSHEET - BUILD ALTERNATIVE  |              |  |  |                                |                                    |   | (Rev.11a, June 4, 2008)                            |
|---|--------------|--|--|--------------------------------|------------------------------------|---|--|
| SCAG High Speed Regional Transportation System Alternatives Analysis        |              |  |  |                                |                                    | Today's Date                                      | 11/10/08   |
| Alternative: MAGLEV on I-10   |              |  |  |                                |                                    | Yr of Base Year \$                                | 2008   |
|   |              |  |  |                                |                                    | Yr of Revenue Ops                                 | 2012   |
|   | Quantity     | Base Year Dollars w/o Contingency (X000) | Base Year Dollars Allocated Contingency (X000) | Base Year Dollars TOTAL (X000) | Base Year Dollars Unit Cost (X000) | Base Year Dollars Percentage of Construction Cost | Base Year Dollars Percentage of Total Project Cost |
| <b>10 GUIDEWAY &amp; TRACK ELEMENTS (route miles)</b>                       | <b>54.50</b> | <b>2,552,105</b>                         | <b>461,991</b>                                 | <b>3,014,096</b>               | <b>\$ 55,305</b>                   | <b>59%</b>  | <b>43%</b>   |
| 10.01 Guideway: At-grade exclusive right-of-way                             |              |  |  | 0                              |                                    |   |  |
| 10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)              |              |  |  | 0                              |                                    |   |  |
| 10.03 Guideway: At-grade in mixed traffic                                   |              |  |  | 0                              |                                    |   |  |
| 10.04 Guideway: Aerial structure  | 54.50        | 1,357,858                                | 339,465  | 1,697,323                      | \$ 31,144                          |   |  |
| 10.05 Guideway: Built-up fill   |              |  |  | 0                              |                                    |   |  |
| 10.06 Guideway: Underground cut & cover                                     |              |  |  | 0                              |                                    |   |  |
| 10.07 Guideway: Underground tunnel  |              |  |  | 0                              |                                    |   |  |
| 10.08 Guideway: Retained cut or fill  |              | 20,680                                   | 5,170  | 25,850                         |                                    |   |  |
| 10.09 Track: Direct fixation  |              | 1,173,567                                | 117,357  | 1,290,923                      |                                    |   |  |
| 10.10 Track: Embedded   |              |  |  | 0                              |                                    |   |  |
| 10.11 Track: Ballasted  |              |  |  | 0                              |                                    |   |  |
| 10.12 Track: Special (switches, turnouts)                                   |              |  |  | 0                              |                                    |   |  |
| 10.13 Track: Vibration and noise dampening                                  |              |  |  | 0                              |                                    |   |  |
| <b>20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)</b>                   | <b>4</b>     | <b>368,375</b>                           | <b>92,094</b>                                  | <b>460,469</b>                 | <b>\$ 115,117</b>                  | <b>9%</b>   | <b>7%</b>  |
| 20.01 At-grade station, stop, shelter, mall, terminal, platform             |              |  |  | 0                              |                                    |   |  |
| 20.02 Aerial station, stop, shelter, mall, terminal, platform               | 4            | 266,000                                  | 66,500   | 332,500                        | \$ 83,125                          |   |  |
| 20.03 Underground station, stop, shelter, mall, terminal, platform          |              |  |  | 0                              |                                    |   |  |
| 20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc. |              |  |  | 0                              |                                    |   |  |
| 20.05 Joint development   |              |  |  | 0                              |                                    |   |  |
| 20.06 Automobile parking multi-story structure                              |              | 102,375                                  | 25,594   | 127,969                        |                                    |   |  |
| 20.07 Elevators, escalators   |              |  |  | 0                              |                                    |   |  |
| <b>30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS</b>                    | <b>54.50</b> | <b>204,400</b>                           | <b>51,100</b>                                  | <b>255,500</b>                 | <b>\$ 4,688</b>                    | <b>5%</b>   | <b>4%</b>  |
| 30.01 Administration Building: Office, sales, storage, revenue counting     |              |  |  | 0                              |                                    |   |  |
| 30.02 Light Maintenance Facility  |              | 204,400                                  | 51,100   | 255,500                        |                                    |   |  |
| 30.03 Heavy Maintenance Facility  |              |  |  | 0                              |                                    |   |  |
| 30.04 Storage or Maintenance of Way Building                                |              |  |  | 0                              |                                    |   |  |
| 30.05 Yard and Yard Track   |              |  |  | 0                              |                                    |   |  |
| <b>40 SITEWORK &amp; SPECIAL CONDITIONS</b>                                 | <b>54.50</b> | <b>229,670</b>                           | <b>26,463</b>                                  | <b>256,134</b>                 | <b>\$ 4,700</b>                    | <b>5%</b>   | <b>4%</b>  |
| 40.01 Demolition, Clearing, Earthwork                                       |              |  |  | 0                              |                                    |   |  |
| 40.02 Site Utilities, Utility Relocation                                    |              | 50,229                                   | 12,557   | 62,786                         |                                    |   |  |
| 40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments |              |  |  | 0                              |                                    |   |  |
| 40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks  |              | 123,817                                  |  | 123,817                        |                                    |   |  |
| 40.05 Site structures including retaining walls, sound walls                |              |  |  | 0                              |                                    |   |  |
| 40.06 Pedestrian / bike access and accommodation, landscaping               |              |  |  | 0                              |                                    |   |  |
| 40.07 Automobile, bus, van accessways including roads, parking lots         |              | 45,214                                   | 11,303   | 56,517                         |                                    |   |  |
| 40.08 Temporary Facilities and other indirect costs during construction     |              | 10,411                                   | 2,603  | 13,013                         |                                    |   |  |
| <b>50 SYSTEMS</b>   | <b>54.50</b> | <b>906,905</b>                           | <b>226,726</b>                                 | <b>1,133,631</b>               | <b>\$ 20,801</b>                   | <b>22%</b>  | <b>16%</b>   |
| 50.01 Train control and signals   |              | 302,397                                  | 75,599   | 377,997                        |                                    |   |  |
| 50.02 Traffic signals and crossing protection                               |              |  |  | 0                              |                                    |   |  |
| 50.03 Traction power supply: substations                                    |              | 604,507                                  | 151,127  | 755,634                        |                                    |   |  |
| 50.04 Traction power distribution: catenary and third rail                  |              |  |  | 0                              |                                    |   |  |
| 50.05 Communications  |              |  |  | 0                              |                                    |   |  |
| 50.06 Fare collection system and equipment                                  |              |  |  | 0                              |                                    |   |  |
| 50.07 Central Control   |              |  |  | 0                              |                                    |   |  |
| <b>Construction Subtotal (10 - 50)</b>                                      | <b>54.50</b> | <b>4,261,455</b>                         | <b>858,375</b>                                 | <b>5,119,830</b>               | <b>\$ 93,942</b>                   | <b>100%</b>                                       | <b>73%</b>   |
| <b>60 ROW, LAND, EXISTING IMPROVEMENTS</b>                                  | <b>54.50</b> | <b>120,692</b>                           | <b>30,173</b>                                  | <b>150,865</b>                 | <b>\$ 2,768</b>                    |   | <b>2%</b>  |
| 60.01 Purchase or lease of real estate                                      |              | 120,692                                  | 30,173   | 150,865                        |                                    |   |  |
| 60.02 Relocation of existing households and businesses                      |              |  |  | 0                              |                                    |   |  |
| <b>70 VEHICLES (number)</b>   | <b>42</b>    | <b>471,319</b>                           | <b>44,888</b>                                  | <b>516,206</b>                 | <b>\$ 12,291</b>                   |   | <b>7%</b>  |
| 70.01 Light Rail  |              |  |  | 0                              |                                    |   |  |
| 70.02 Heavy Rail  |              |  |  | 0                              |                                    |   |  |
| 70.03 Commuter Rail   | 42           | 471,319                                  | 44,888   | 516,206                        | \$ 12,291                          |   |  |
| 70.04 Bus   |              |  |  | 0                              |                                    |   |  |
| 70.05 Other   |              |  |  | 0                              |                                    |   |  |
| 70.06 Non-revenue vehicles  |              |  |  | 0                              |                                    |   |  |
| 70.07 Spare parts   |              |  |  | 0                              |                                    |   |  |
| <b>80 PROFESSIONAL SERVICES (applies to Cats. 10-50)</b>                    | <b>54.50</b> | <b>1,238,168</b>                         | <b>0</b>                                       | <b>1,238,168</b>               | <b>\$ 22,719</b>                   | <b>24%</b>  | <b>18%</b>   |
| 80.01 Preliminary Engineering   |              | 123,817                                  | 0  | 123,817                        |                                    |   |  |
| 80.02 Final Design  |              | 288,906                                  | 0  | 288,906                        |                                    |   |  |
| 80.03 Project Management for Design and Construction                        |              | 330,178                                  | 0  | 330,178                        |                                    |   |  |
| 80.04 Construction Administration & Management                              |              | 206,361                                  | 0  | 206,361                        |                                    |   |  |
| 80.05 Professional Liability and other Non-Construction Insurance           |              | 206,361                                  | 0  | 206,361                        |                                    |   |  |
| 80.06 Legal; Permits; Review Fees by other agencies, cities, etc.           |              |  |  | 0                              |                                    |   |  |
| 80.07 Surveys, Testing, Investigation, Inspection                           |              | 82,544.55                                | 0  | 82,545                         |                                    |   |  |
| 80.08 Start up  |              |  |  | 0                              |                                    |   |  |
| <b>Subtotal (10 - 80)</b>   | <b>54.50</b> | <b>6,091,634</b>                         | <b>933,435</b>                                 | <b>7,025,069</b>               | <b>\$ 128,900</b>                  |   | <b>100%</b>  |
| <b>90 UNALLOCATED CONTINGENCY</b>   |              |  |  | <b>0</b>                       |                                    |   | <b>0%</b>  |
| <b>Subtotal (10 - 90)</b>   | <b>54.50</b> |  |  | <b>7,025,069</b>               | <b>\$ 128,900</b>                  |   | <b>100%</b>  |
| <b>100 FINANCE CHARGES</b>  |              |  |  | <b>0</b>                       |                                    |   | <b>0%</b>  |
| <b>Total Project Cost (10 - 100)</b>  | <b>54.50</b> |  |  | <b>7,025,069</b>               | <b>\$ 128,900</b>                  |   | <b>100%</b>  |
| Allocated Contingency as % of Base Yr Dollars w/o Contingency               |              |  |  | 15.32%                         |                                    |   |  |
| Unallocated Contingency as % of Base Yr Dollars w/o Contingency             |              |  |  | 0.00%                          |                                    |   |  |
| Total Contingency as % of Base Yr Dollars w/o Contingency                   |              |  |  | 15.32%                         |                                    |   |  |
| Unallocated Contingency as % of Subtotal (10 - 80)                          |              |  |  | 0.00%                          |                                    |   |  |

**MAIN WORKSHEET - BUILD ALTERNATIVE** (Rev.11a, June 4, 2008)

SCAG High Speed Regional Transportation System Alternatives Analysis  
 Alternative: SWT on I-10

Today's Date **11/10/08**

Yr of Base Year \$ **2008**

Yr of Revenue Ops **2012**

|   | Quantity     | Base Year Dollars w/o Contingency (X000) | Base Year Dollars Allocated Contingency (X000) | Base Year Dollars TOTAL (X000) | Base Year Dollars Unit Cost (X000) | Base Year Dollars Percentage of Construction Cost | Base Year Dollars Percentage of Total Project Cost |
|---|--------------|--|--|--------------------------------|------------------------------------|---|--|
| <b>10 GUIDEWAY &amp; TRACK ELEMENTS (route miles)</b>                       | <b>54.50</b> | <b>1,677,511</b>                         | <b>392,856</b>                                 | <b>2,070,367</b>               | <b>\$ 37,988</b>                   | <b>63%</b>  | <b>47%</b>   |
| 10.01 Guideway: At-grade exclusive right-of-way                             |              |  |  | 0                              |                                    |   |  |
| 10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)              |              |  |  | 0                              |                                    |   |  |
| 10.03 Guideway: At-grade in mixed traffic                                   |              |  |  | 0                              |                                    |   |  |
| 10.04 Guideway: Aerial structure  | 54.50        | 1,478,712                                | 369,678  | 1,848,390                      | \$ 33,915                          |   |  |
| 10.05 Guideway: Built-up fill   |              |  |  | 0                              |                                    |   |  |
| 10.06 Guideway: Underground cut & cover                                     |              |  |  | 0                              |                                    |   |  |
| 10.07 Guideway: Underground tunnel  |              |  |  | 0                              |                                    |   |  |
| 10.08 Guideway: Retained cut or fill  |              | 21,990                                   | 5,498  | 27,488                         |                                    |   |  |
| 10.09 Track: Direct fixation  |              | 176,809                                  | 17,681   | 194,489                        |                                    |   |  |
| 10.10 Track: Embedded   |              |  |  | 0                              |                                    |   |  |
| 10.11 Track: Ballasted  |              |  |  | 0                              |                                    |   |  |
| 10.12 Track: Special (switches, turnouts)                                   |              |  |  | 0                              |                                    |   |  |
| 10.13 Track: Vibration and noise dampening                                  |              |  |  | 0                              |                                    |   |  |
| <b>20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)</b>                   | <b>4</b>     | <b>368,375</b>                           | <b>92,094</b>                                  | <b>460,469</b>                 | <b>\$ 115,117</b>                  | <b>14%</b>  | <b>10%</b>   |
| 20.01 At-grade station, stop, shelter, mall, terminal, platform             |              |  |  | 0                              |                                    |   |  |
| 20.02 Aerial station, stop, shelter, mall, terminal, platform               | 4            | 266,000                                  | 66,500   | 332,500                        | \$ 83,125                          |   |  |
| 20.03 Underground station, stop, shelter, mall, terminal, platform          |              |  |  | 0                              |                                    |   |  |
| 20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc. |              |  |  | 0                              |                                    |   |  |
| 20.05 Joint development   |              |  |  | 0                              |                                    |   |  |
| 20.06 Automobile parking multi-story structure                              |              | 102,375                                  | 25,594   | 127,969                        |                                    |   |  |
| 20.07 Elevators, escalators   |              |  |  | 0                              |                                    |   |  |
| <b>30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS</b>                    | <b>54.50</b> | <b>156,822</b>                           | <b>39,206</b>                                  | <b>196,028</b>                 | <b>\$ 3,597</b>                    | <b>6%</b>   | <b>4%</b>  |
| 30.01 Administration Building: Office, sales, storage, revenue counting     |              |  |  | 0                              |                                    |   |  |
| 30.02 Light Maintenance Facility  |              | 140,022                                  | 35,006   | 175,028                        |                                    |   |  |
| 30.03 Heavy Maintenance Facility  |              |  |  | 0                              |                                    |   |  |
| 30.04 Storage or Maintenance of Way Building                                |              |  |  | 0                              |                                    |   |  |
| 30.05 Yard and Yard Track   |              | 16,800                                   | 4,200  | 21,000                         |                                    |   |  |
| <b>40 SITEWORK &amp; SPECIAL CONDITIONS</b>                                 | <b>54.50</b> | <b>178,679</b>                           | <b>25,444</b>                                  | <b>204,123</b>                 | <b>\$ 3,745</b>                    | <b>6%</b>   | <b>5%</b>  |
| 40.01 Demolition, Clearing, Earthwork                                       |              |  |  | 0                              |                                    |   |  |
| 40.02 Site Utilities, Utility Relocation                                    |              | 48,297                                   | 12,074   | 60,371                         |                                    |   |  |
| 40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments |              |  |  | 0                              |                                    |   |  |
| 40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks  |              | 76,904                                   |  | 76,904                         |                                    |   |  |
| 40.05 Site structures including retaining walls, sound walls                |              |  |  | 0                              |                                    |   |  |
| 40.06 Pedestrian / bike access and accommodation, landscaping               |              |  |  | 0                              |                                    |   |  |
| 40.07 Automobile, bus, van accessways including roads, parking lots         |              | 43,467                                   | 10,867   | 54,334                         |                                    |   |  |
| 40.08 Temporary Facilities and other indirect costs during construction     |              | 10,011                                   | 2,503  | 12,513                         |                                    |   |  |
| <b>50 SYSTEMS</b>   | <b>54.50</b> | <b>268,981</b>                           | <b>67,245</b>                                  | <b>336,226</b>                 | <b>\$ 6,169</b>                    | <b>10%</b>  | <b>8%</b>  |
| 50.01 Train control and signals   |              | 86,085                                   | 21,521   | 107,607                        |                                    |   |  |
| 50.02 Traffic signals and crossing protection                               |              |  |  | 0                              |                                    |   |  |
| 50.03 Traction power supply: substations                                    |              | 40,869                                   | 10,217   | 51,086                         |                                    |   |  |
| 50.04 Traction power distribution: catenary and third rail                  |              | 75,941                                   | 18,985   | 94,926                         |                                    |   |  |
| 50.05 Communications  |              | 66,086                                   | 16,521   | 82,607                         |                                    |   |  |
| 50.06 Fare collection system and equipment                                  |              |  |  | 0                              |                                    |   |  |
| 50.07 Central Control   |              |  |  | 0                              |                                    |   |  |
| <b>Construction Subtotal (10 - 50)</b>                                      | <b>54.50</b> | <b>2,650,367</b>                         | <b>616,845</b>                                 | <b>3,267,213</b>               | <b>\$ 59,949</b>                   | <b>100%</b>                                       | <b>74%</b>   |
| <b>60 ROW, LAND, EXISTING IMPROVEMENTS</b>                                  | <b>54.50</b> | <b>117,541</b>                           | <b>29,385</b>                                  | <b>146,927</b>                 | <b>\$ 2,696</b>                    |   | <b>3%</b>  |
| 60.01 Purchase or lease of real estate                                      |              | 117,541                                  | 29,385   | 146,927                        |                                    |   |  |
| 60.02 Relocation of existing households and businesses                      |              |  |  | 0                              |                                    |   |  |
| <b>70 VEHICLES (number)</b>   | <b>42</b>    | <b>210,000</b>                           | <b>21,000</b>                                  | <b>231,000</b>                 | <b>\$ 5,500</b>                    |   | <b>5%</b>  |
| 70.01 Light Rail  |              |  |  | 0                              |                                    |   |  |
| 70.02 Heavy Rail  |              |  |  | 0                              |                                    |   |  |
| 70.03 Commuter Rail   | 42           | 210,000                                  | 21,000   | 231,000                        | \$ 5,500                           |   |  |
| 70.04 Bus   |              |  |  | 0                              |                                    |   |  |
| 70.05 Other   |              |  |  | 0                              |                                    |   |  |
| 70.06 Non-revenue vehicles  |              |  |  | 0                              |                                    |   |  |
| 70.07 Spare parts   |              |  |  | 0                              |                                    |   |  |
| <b>80 PROFESSIONAL SERVICES (applies to Cats. 10-50)</b>                    | <b>54.50</b> | <b>769,036</b>                           | <b>0</b>                                       | <b>769,036</b>                 | <b>\$ 14,111</b>                   | <b>24%</b>  | <b>17%</b>   |
| 80.01 Preliminary Engineering   |              | 76,904                                   | 0  | 76,904                         |                                    |   |  |
| 80.02 Final Design  |              | 179,442                                  | 0  | 179,442                        |                                    |   |  |
| 80.03 Project Management for Design and Construction                        |              | 205,076                                  | 0  | 205,076                        |                                    |   |  |
| 80.04 Construction Administration & Management                              |              | 128,173                                  | 0  | 128,173                        |                                    |   |  |
| 80.05 Professional Liability and other Non-Construction Insurance           |              | 128,173                                  | 0  | 128,173                        |                                    |   |  |
| 80.06 Legal; Permits; Review Fees by other agencies, cities, etc.           |              |  |  | 0                              |                                    |   |  |
| 80.07 Surveys, Testing, Investigation, Inspection                           |              |  |  | 0                              |                                    |   |  |
| 80.08 Start up  |              | 51,269                                   | 0  | 51,269                         |                                    |   |  |
| <b>Subtotal (10 - 80)</b>   | <b>54.50</b> | <b>3,746,945</b>                         | <b>667,231</b>                                 | <b>4,414,175</b>               | <b>\$ 80,994</b>                   |   | <b>100%</b>  |
| <b>90 UNALLOCATED CONTINGENCY</b>   |              |  |  | <b>0</b>                       |                                    |   | <b>0%</b>  |
| <b>Subtotal (10 - 90)</b>   | <b>54.50</b> |  |  | <b>4,414,175</b>               | <b>\$ 80,994</b>                   |   | <b>100%</b>  |
| <b>100 FINANCE CHARGES</b>  |              |  |  | <b>0</b>                       |                                    |   | <b>0%</b>  |
| <b>Total Project Cost (10 - 100)</b>  | <b>54.50</b> |  |  | <b>4,414,175</b>               | <b>\$ 80,994</b>                   |   | <b>100%</b>  |
| Allocated Contingency as % of Base Yr Dollars w/o Contingency               |              |  |  | 17.81%                         |                                    |   |  |
| Unallocated Contingency as % of Base Yr Dollars w/o Contingency             |              |  |  | 0.00%                          |                                    |   |  |
| Total Contingency as % of Base Yr Dollars w/o Contingency                   |              |  |  | 17.81%                         |                                    |   |  |
| Unallocated Contingency as % of Subtotal (10 - 80)                          |              |  |  | 0.00%                          |                                    |   |  |

| MAIN WORKSHEET - BUILD ALTERNATIVE   |              |  |  |                                |                                    |   | (Rev.11a, June 4, 2008)                            |
|--|--------------|--|--|--------------------------------|------------------------------------|---|--|
| SCAG High Speed Regional Transportation System Alternatives Analysis         |              |  |  |                                |                                    | Today's Date                                      | 11/10/08   |
| Alternative: MAGLEV on UPRR  |              |  |  |                                |                                    | Yr of Base Year \$                                | 2008   |
|  |              |  |  |                                |                                    | Yr of Revenue Ops                                 | 2012   |
|  | Quantity     | Base Year Dollars w/o Contingency (X000) | Base Year Dollars Allocated Contingency (X000) | Base Year Dollars TOTAL (X000) | Base Year Dollars Unit Cost (X000) | Base Year Dollars Percentage of Construction Cost | Base Year Dollars Percentage of Total Project Cost |
| <b>10 GUIDEWAY &amp; TRACK ELEMENTS (route miles)</b>                        | <b>58.70</b> | <b>2,965,343</b>                         | <b>542,501</b>                                 | <b>3,507,844</b>               | <b>\$ 59,759</b>                   | <b>61%</b>  | <b>45%</b>   |
| 10.01 Guideway: At-grade exclusive right-of-way                              |              |  |  | 0                              |                                    |   |  |
| 10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)               |              |  |  | 0                              |                                    |   |  |
| 10.03 Guideway: At-grade in mixed traffic                                    |              |  |  | 0                              |                                    |   |  |
| 10.04 Guideway: Aerial structure   | 58.70        | 1,639,779                                | 409,945  | 2,049,724                      | \$ 34,919                          |   |  |
| 10.05 Guideway: Built-up fill  |              |  |  | 0                              |                                    |   |  |
| 10.06 Guideway: Underground cut & cover                                      |              |  |  | 0                              |                                    |   |  |
| 10.07 Guideway: Underground tunnel   |              |  |  | 0                              |                                    |   |  |
| 10.08 Guideway: Retained cut or fill   |              |  |  | 0                              |                                    |   |  |
| 10.09 Track: Direct fixation   |              | 1,325,564                                | 132,556  | 1,458,120                      |                                    |   |  |
| 10.10 Track: Embedded  |              |  |  | 0                              |                                    |   |  |
| 10.11 Track: Ballasted   |              |  |  | 0                              |                                    |   |  |
| 10.12 Track: Special (switches, turnouts)                                    |              |  |  | 0                              |                                    |   |  |
| 10.13 Track: Vibration and noise dampening                                   |              |  |  | 0                              |                                    |   |  |
| <b>20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)</b>                    | <b>4</b>     | <b>368,375</b>                           | <b>92,094</b>                                  | <b>460,469</b>                 | <b>\$ 115,117</b>                  | <b>8%</b>   | <b>6%</b>  |
| 20.01 At-grade station, stop, shelter, mall, terminal, platform              |              |  |  | 0                              |                                    |   |  |
| 20.02 Aerial station, stop, shelter, mall, terminal, platform                | 4            | 266,000                                  | 66,500   | 332,500                        | \$ 83,125                          |   |  |
| 20.03 Underground station, stop, shelter, mall, terminal, platform           |              |  |  | 0                              |                                    |   |  |
| 20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.  |              |  |  | 0                              |                                    |   |  |
| 20.05 Joint development  |              |  |  | 0                              |                                    |   |  |
| 20.06 Automobile parking multi-story structure                               |              | 102,375                                  | 25,594   | 127,969                        |                                    |   |  |
| 20.07 Elevators, escalators  |              |  |  | 0                              |                                    |   |  |
| <b>30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS</b>                     | <b>58.70</b> | <b>204,400</b>                           | <b>51,100</b>                                  | <b>255,500</b>                 | <b>\$ 4,353</b>                    | <b>4%</b>   | <b>3%</b>  |
| 30.01 Administration Building: Office, sales, storage, revenue counting      |              |  |  | 0                              |                                    |   |  |
| 30.02 Light Maintenance Facility   |              | 204,400                                  | 51,100   | 255,500                        |                                    |   |  |
| 30.03 Heavy Maintenance Facility   |              |  |  | 0                              |                                    |   |  |
| 30.04 Storage or Maintenance of Way Building                                 |              |  |  | 0                              |                                    |   |  |
| 30.05 Yard and Yard Track  |              |  |  | 0                              |                                    |   |  |
| <b>40 SITEWORK &amp; SPECIAL CONDITIONS</b>                                  | <b>58.70</b> | <b>174,179</b>                           | <b>8,952</b>                                   | <b>183,131</b>                 | <b>\$ 3,120</b>                    | <b>3%</b>   | <b>2%</b>  |
| 40.01 Demolition, Clearing, Earthwork  |              |  |  | 0                              |                                    |   |  |
| 40.02 Site Utilities, Utility Relocation                                     |              | 16,994                                   | 4,248  | 21,242                         |                                    |   |  |
| 40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments  |              |  |  | 0                              |                                    |   |  |
| 40.04 Environmental mitigation, e.g. wetlands, historic/archeological, parks |              | 138,370                                  |  | 138,370                        |                                    |   |  |
| 40.05 Site structures including retaining walls, sound walls                 |              |  |  | 0                              |                                    |   |  |
| 40.06 Pedestrian / bike access and accommodation, landscaping                |              |  |  | 0                              |                                    |   |  |
| 40.07 Automobile, bus, van accessways including roads, parking lots          |              | 15,290                                   | 3,823  | 19,113                         |                                    |   |  |
| 40.08 Temporary Facilities and other indirect costs during construction      |              | 3,525                                    | 881  | 4,407                          |                                    |   |  |
| <b>50 SYSTEMS</b>  | <b>58.70</b> | <b>1,041,926</b>                         | <b>260,482</b>                                 | <b>1,302,408</b>               | <b>\$ 22,188</b>                   | <b>23%</b>  | <b>17%</b>   |
| 50.01 Train control and signals  |              | 347,419                                  | 86,855   | 434,273                        |                                    |   |  |
| 50.02 Traffic signals and crossing protection                                |              |  |  | 0                              |                                    |   |  |
| 50.03 Traction power supply: substations                                     |              | 694,507                                  | 173,627  | 868,134                        |                                    |   |  |
| 50.04 Traction power distribution: catenary and third rail                   |              |  |  | 0                              |                                    |   |  |
| 50.05 Communications   |              |  |  | 0                              |                                    |   |  |
| 50.06 Fare collection system and equipment                                   |              |  |  | 0                              |                                    |   |  |
| 50.07 Central Control  |              |  |  | 0                              |                                    |   |  |
| <b>Construction Subtotal (10 - 50)</b>                                       | <b>58.70</b> | <b>4,754,223</b>                         | <b>955,129</b>                                 | <b>5,709,352</b>               | <b>\$ 97,263</b>                   | <b>100%</b>                                       | <b>73%</b>   |
| <b>60 ROW, LAND, EXISTING IMPROVEMENTS</b>                                   | <b>58.70</b> | <b>168,592</b>                           | <b>42,148</b>                                  | <b>210,740</b>                 | <b>\$ 3,590</b>                    |   | <b>3%</b>  |
| 60.01 Purchase or lease of real estate                                       |              | 168,592                                  | 42,148   | 210,740                        |                                    |   |  |
| 60.02 Relocation of existing households and businesses                       |              |  |  | 0                              |                                    |   |  |
| <b>70 VEHICLES (number)</b>  | <b>48</b>    | <b>471,319</b>                           | <b>44,888</b>                                  | <b>516,206</b>                 | <b>\$ 10,754</b>                   |   | <b>7%</b>  |
| 70.01 Light Rail   |              |  |  | 0                              |                                    |   |  |
| 70.02 Heavy Rail   |              |  |  | 0                              |                                    |   |  |
| 70.03 Commuter Rail  | 48           | 471,319                                  | 44,888   | 516,206                        | \$ 10,754                          |   |  |
| 70.04 Bus  |              |  |  | 0                              |                                    |   |  |
| 70.05 Other  |              |  |  | 0                              |                                    |   |  |
| 70.06 Non-revenue vehicles   |              |  |  | 0                              |                                    |   |  |
| 70.07 Spare parts  |              |  |  | 0                              |                                    |   |  |
| <b>80 PROFESSIONAL SERVICES (applies to Cats. 10-50)</b>                     | <b>58.70</b> | <b>1,383,698</b>                         | <b>0</b>                                       | <b>1,383,698</b>               | <b>\$ 23,572</b>                   | <b>24%</b>  | <b>18%</b>   |
| 80.01 Preliminary Engineering  |              | 138,370                                  | 0  | 138,370                        |                                    |   |  |
| 80.02 Final Design   |              | 322,863                                  | 0  | 322,863                        |                                    |   |  |
| 80.03 Project Management for Design and Construction                         |              | 368,986                                  | 0  | 368,986                        |                                    |   |  |
| 80.04 Construction Administration & Management                               |              | 230,616                                  | 0  | 230,616                        |                                    |   |  |
| 80.05 Professional Liability and other Non-Construction Insurance            |              | 230,616                                  | 0  | 230,616                        |                                    |   |  |
| 80.06 Legal; Permits; Review Fees by other agencies, cities, etc.            |              |  |  | 0                              |                                    |   |  |
| 80.07 Surveys, Testing, Investigation, Inspection                            |              | 92,247                                   | 0  | 92,247                         |                                    |   |  |
| 80.08 Start up   |              |  |  | 0                              |                                    |   |  |
| <b>Subtotal (10 - 80)</b>  | <b>58.70</b> | <b>6,777,833</b>                         | <b>1,042,164</b>                               | <b>7,819,997</b>               | <b>\$ 133,220</b>                  |   | <b>100%</b>  |
| <b>90 UNALLOCATED CONTINGENCY</b>  |              |  |  |                                |                                    |   | <b>0%</b>  |
| <b>Subtotal (10 - 90)</b>  | <b>58.70</b> |  |  | <b>7,819,997</b>               | <b>\$ 133,220</b>                  |   | <b>100%</b>  |
| <b>100 FINANCE CHARGES</b>   |              |  |  | <b>0</b>                       |                                    |   | <b>0%</b>  |
| <b>Total Project Cost (10 - 100)</b>   | <b>58.70</b> |  |  | <b>7,819,997</b>               | <b>\$ 133,220</b>                  |   | <b>100%</b>  |
| Allocated Contingency as % of Base Yr Dollars w/o Contingency                |              |  |  | 15.38%                         |                                    |   |  |
| Unallocated Contingency as % of Base Yr Dollars w/o Contingency              |              |  |  | 0.00%                          |                                    |   |  |
| Total Contingency as % of Base Yr Dollars w/o Contingency                    |              |  |  | 15.38%                         |                                    |   |  |
| Unallocated Contingency as % of Subtotal (10 - 80)                           |              |  |  | 0.00%                          |                                    |   |  |

| MAIN WORKSHEET - BUILD ALTERNATIVE  |              |  |  |                                |                                    |   | (Rev.11a, June 4, 2008)                            |
|---|--------------|--|--|--------------------------------|------------------------------------|---|--|
| SCAG High Speed Regional Transportation System Alternatives Analysis        |              |  |  |                                |                                    | Today's Date                                      | 11/10/08   |
| Alternative: SWT on UPRR  |              |  |  |                                |                                    | Yr of Base Year \$                                | 2008   |
|   |              |  |  |                                |                                    | Yr of Revenue Ops                                 | 2012   |
|   | Quantity     | Base Year Dollars w/o Contingency (X000) | Base Year Dollars Allocated Contingency (X000) | Base Year Dollars TOTAL (X000) | Base Year Dollars Unit Cost (X000) | Base Year Dollars Percentage of Construction Cost | Base Year Dollars Percentage of Total Project Cost |
| <b>10 GUIDEWAY &amp; TRACK ELEMENTS (route miles)</b>                       | <b>58.70</b> | <b>1,804,086</b>                         | <b>420,584</b>                                 | <b>2,224,671</b>               | <b>\$ 37,899</b>                   | <b>66%</b>  | <b>48%</b>   |
| 10.01 Guideway: At-grade exclusive right-of-way                             |              |  |  | 0                              |                                    |   |  |
| 10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)              |              |  |  | 0                              |                                    |   |  |
| 10.03 Guideway: At-grade in mixed traffic                                   |              |  |  | 0                              |                                    |   |  |
| 10.04 Guideway: Aerial structure  | 58.70        | 1,601,172                                | 400,293  | 2,001,465                      | \$ 34,097                          |   |  |
| 10.05 Guideway: Built-up fill   |              |  |  | 0                              |                                    |   |  |
| 10.06 Guideway: Underground cut & cover                                     |              |  |  | 0                              |                                    |   |  |
| 10.07 Guideway: Underground tunnel  |              |  |  | 0                              |                                    |   |  |
| 10.08 Guideway: Retained cut or fill  |              |  |  | 0                              |                                    |   |  |
| 10.09 Track: Direct fixation  |              | 202,914                                  | 20,291   | 223,205                        |                                    |   |  |
| 10.10 Track: Embedded   |              |  |  | 0                              |                                    |   |  |
| 10.11 Track: Ballasted  |              |  |  | 0                              |                                    |   |  |
| 10.12 Track: Special (switches, turnouts)                                   |              |  |  | 0                              |                                    |   |  |
| 10.13 Track: Vibration and noise dampening                                  |              |  |  | 0                              |                                    |   |  |
| <b>20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)</b>                   | <b>4</b>     | <b>368,375</b>                           | <b>92,094</b>                                  | <b>460,469</b>                 | <b>\$ 115,117</b>                  | <b>14%</b>  | <b>10%</b>   |
| 20.01 At-grade station, stop, shelter, mall, terminal, platform             |              |  |  | 0                              |                                    |   |  |
| 20.02 Aerial station, stop, shelter, mall, terminal, platform               | 4            | 266,000                                  | 66,500   | 332,500                        | \$ 83,125                          |   |  |
| 20.03 Underground station, stop, shelter, mall, terminal, platform          |              |  |  | 0                              |                                    |   |  |
| 20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc. |              |  |  | 0                              |                                    |   |  |
| 20.05 Joint development   |              |  |  | 0                              |                                    |   |  |
| 20.06 Automobile parking multi-story structure                              |              | 102,375                                  | 25,594   | 127,969                        |                                    |   |  |
| 20.07 Elevators, escalators   |              |  |  | 0                              |                                    |   |  |
| <b>30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS</b>                    | <b>58.70</b> | <b>156,822</b>                           | <b>39,206</b>                                  | <b>196,028</b>                 | <b>\$ 3,339</b>                    | <b>6%</b>   | <b>4%</b>  |
| 30.01 Administration Building: Office, sales, storage, revenue counting     |              |  |  | 0                              |                                    |   |  |
| 30.02 Light Maintenance Facility  |              | 140,022                                  | 35,006   | 175,028                        |                                    |   |  |
| 30.03 Heavy Maintenance Facility  |              |  |  | 0                              |                                    |   |  |
| 30.04 Storage or Maintenance of Way Building                                |              |  |  | 0                              |                                    |   |  |
| 30.05 Yard and Yard Track   |              | 16,800                                   | 4,200  | 21,000                         |                                    |   |  |
| <b>40 SITEWORK &amp; SPECIAL CONDITIONS</b>                                 | <b>58.70</b> | <b>114,503</b>                           | <b>8,608</b>                                   | <b>123,112</b>                 | <b>\$ 2,097</b>                    | <b>4%</b>   | <b>3%</b>  |
| 40.01 Demolition, Clearing, Earthwork                                       |              |  |  | 0                              |                                    |   |  |
| 40.02 Site Utilities, Utility Relocation                                    |              | 16,340                                   | 4,085  | 20,425                         |                                    |   |  |
| 40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments |              |  |  | 0                              |                                    |   |  |
| 40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks  |              | 80,071                                   |  | 80,071                         |                                    |   |  |
| 40.05 Site structures including retaining walls, sound walls                |              |  |  | 0                              |                                    |   |  |
| 40.06 Pedestrian / bike access and accommodation, landscaping               |              |  |  | 0                              |                                    |   |  |
| 40.07 Automobile, bus, van accessways including roads, parking lots         |              | 14,706                                   | 3,676  | 18,382                         |                                    |   |  |
| 40.08 Temporary Facilities and other indirect costs during construction     |              | 3,387                                    | 847  | 4,234                          |                                    |   |  |
| <b>50 SYSTEMS</b>   | <b>58.70</b> | <b>308,695</b>                           | <b>77,174</b>                                  | <b>385,869</b>                 | <b>\$ 6,574</b>                    | <b>11%</b>  | <b>8%</b>  |
| 50.01 Train control and signals   |              | 98,796                                   | 24,699   | 123,495                        |                                    |   |  |
| 50.02 Traffic signals and crossing protection                               |              |  |  | 0                              |                                    |   |  |
| 50.03 Traction power supply: substations                                    |              | 46,903                                   | 11,726   | 58,629                         |                                    |   |  |
| 50.04 Traction power distribution: catenary and third rail                  |              | 87,153                                   | 21,788   | 108,942                        |                                    |   |  |
| 50.05 Communications  |              | 75,843                                   | 18,961   | 94,804                         |                                    |   |  |
| 50.06 Fare collection system and equipment                                  |              |  |  | 0                              |                                    |   |  |
| 50.07 Central Control   |              |  |  | 0                              |                                    |   |  |
| <b>Construction Subtotal (10 - 50)</b>                                      | <b>58.70</b> | <b>2,752,483</b>                         | <b>637,666</b>                                 | <b>3,390,149</b>               | <b>\$ 57,754</b>                   | <b>100%</b>                                       | <b>73%</b>   |
| <b>60 ROW, LAND, EXISTING IMPROVEMENTS</b>                                  | <b>58.70</b> | <b>163,662</b>                           | <b>40,916</b>                                  | <b>204,578</b>                 | <b>\$ 3,485</b>                    |   | <b>4%</b>  |
| 60.01 Purchase or lease of real estate                                      |              | 163,662                                  | 40,916   | 204,578                        |                                    |   |  |
| 60.02 Relocation of existing households and businesses                      |              |  |  | 0                              |                                    |   |  |
| <b>70 VEHICLES (number)</b>   | <b>42</b>    | <b>210,000</b>                           | <b>21,000</b>                                  | <b>231,000</b>                 | <b>\$ 5,500</b>                    |   | <b>5%</b>  |
| 70.01 Light Rail  |              |  |  | 0                              |                                    |   |  |
| 70.02 Heavy Rail  |              |  |  | 0                              |                                    |   |  |
| 70.03 Commuter Rail   | 42           | 210,000                                  | 21,000   | 231,000                        | \$ 5,500                           |   |  |
| 70.04 Bus   |              |  |  | 0                              |                                    |   |  |
| 70.05 Other   |              |  |  | 0                              |                                    |   |  |
| 70.06 Non-revenue vehicles  |              |  |  | 0                              |                                    |   |  |
| 70.07 Spare parts   |              |  |  | 0                              |                                    |   |  |
| <b>80 PROFESSIONAL SERVICES (applies to Cats. 10-50)</b>                    | <b>58.70</b> | <b>800,708</b>                           | <b>0</b>                                       | <b>800,708</b>                 | <b>\$ 13,641</b>                   | <b>24%</b>  | <b>17%</b>   |
| 80.01 Preliminary Engineering   |              | 80,071                                   | 0  | 80,071                         |                                    |   |  |
| 80.02 Final Design  |              | 186,832                                  | 0  | 186,832                        |                                    |   |  |
| 80.03 Project Management for Design and Construction                        |              | 213,522                                  | 0  | 213,522                        |                                    |   |  |
| 80.04 Construction Administration & Management                              |              | 133,451                                  | 0  | 133,451                        |                                    |   |  |
| 80.05 Professional Liability and other Non-Construction Insurance           |              | 133,451                                  | 0  | 133,451                        |                                    |   |  |
| 80.06 Legal; Permits; Review Fees by other agencies, cities, etc.           |              |  |  | 0                              |                                    |   |  |
| 80.07 Surveys, Testing, Investigation, Inspection                           |              |  |  | 0                              |                                    |   |  |
| 80.08 Start up  |              | 53,381                                   | 0  | 53,381                         |                                    |   |  |
| <b>Subtotal (10 - 80)</b>   | <b>58.70</b> | <b>3,926,852</b>                         | <b>699,581</b>                                 | <b>4,626,434</b>               | <b>\$ 78,815</b>                   |   | <b>100%</b>  |
| <b>90 UNALLOCATED CONTINGENCY</b>   |              |  |  | <b>0</b>                       |                                    |   | <b>0%</b>  |
| <b>Subtotal (10 - 90)</b>   | <b>58.70</b> |  |  | <b>4,626,434</b>               | <b>\$ 78,815</b>                   |   | <b>100%</b>  |
| <b>100 FINANCE CHARGES</b>  |              |  |  | <b>0</b>                       |                                    |   | <b>0%</b>  |
| <b>Total Project Cost (10 - 100)</b>  | <b>58.70</b> |  |  | <b>4,626,434</b>               | <b>\$ 78,815</b>                   |   | <b>100%</b>  |
| Allocated Contingency as % of Base Yr Dollars w/o Contingency               |              |  |  | 17.82%                         |                                    |   |  |
| Unallocated Contingency as % of Base Yr Dollars w/o Contingency             |              |  |  | 0.00%                          |                                    |   |  |
| Total Contingency as % of Base Yr Dollars w/o Contingency                   |              |  |  | 17.82%                         |                                    |   |  |
| Unallocated Contingency as % of Subtotal (10 - 80)                          |              |  |  | 0.00%                          |                                    |   |  |

## **6.4 TAKEOFF DETAILS AND UNIT COSTS**

The following pages show detailed takeoff and unit cost information.

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>                                | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>            | <u>Contingency</u> |
|---|--|---------------|------------------|------------------------|--------------------|
| <b>I10</b><br><b>106+50</b><br><b>969+00</b>          | <b>Maglev - Elevated Section - 2 Tracks</b>                              | <b>86,250</b> |                  | <b>\$1,022,493,750</b> |                    |
|   | Two-Track Elevated Guideway  |               |                  |                        |                    |
|   | 10.04 Elevated Maglev Guideway (2 Tracks)                                | LF 86,250     | \$4,500          | \$388,125,000          | CONSTR 25.0%       |
|   | 10.09 Guideway Beams (Track) Type I                                      | TF 172,500    | \$2,100          | \$362,250,000          | G_MAG 10.0%        |
|   | 50.01 Maglev Signals and Communications                                  | LF 86,250     | \$1,052          | \$90,735,000           | CONSTR 25.0%       |
| 50.03 Maglev Traction Power (Supply and Distribution) | LF 86,250  | \$2,103       | \$181,383,750    | CONSTR 25.0%           |                    |
| <b>I10</b><br><b>123+80</b><br><b>127+10</b>          | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>330</b>    |                  | <b>\$792,000</b>       |                    |
|   | Type 4 Structure   |               |                  |                        |                    |
|   | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 330        | \$4,000          | \$1,320,000            | CONSTR 25.0%       |
|   | 10.09 Guideway Beams (Track) Type I                                      | TF -660       | \$2,100          | (\$1,386,000)          | G_MAG 10.0%        |
| 10.09 Guideway Beams (Track) Type III                 | TF 660   | \$1,300       | \$858,000        | G_MAG 10.0%            |                    |
| <b>I10</b><br><b>153+80</b><br><b>157+60</b>          | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>380</b>    |                  | <b>\$912,000</b>       |                    |
|   | Type 4 Structure   |               |                  |                        |                    |
|   | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 380        | \$4,000          | \$1,520,000            | CONSTR 25.0%       |
|   | 10.09 Guideway Beams (Track) Type III                                    | TF 760        | \$1,300          | \$988,000              | G_MAG 10.0%        |
| 10.09 Guideway Beams (Track) Type I                   | TF -760  | \$2,100       | (\$1,596,000)    | G_MAG 10.0%            |                    |
| <b>I10</b><br><b>189+55</b><br><b>193+20</b>          | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>365</b>    |                  | <b>\$876,000</b>       |                    |
|   | Type 4 Structure   |               |                  |                        |                    |
|   | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 365        | \$4,000          | \$1,460,000            | CONSTR 25.0%       |
|   | 10.09 Guideway Beams (Track) Type I                                      | TF -730       | \$2,100          | (\$1,533,000)          | G_MAG 10.0%        |
| 10.09 Guideway Beams (Track) Type III                 | TF 730   | \$1,300       | \$949,000        | G_MAG 10.0%            |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>I10 235+10</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  |            |                  | <b>\$852,000</b>   |                    |
| <b>238+65</b>          | Type 4 Structure   | <b>355</b> |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,420,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,491,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$923,000          | G_MAG 10.0%        |
|                        |  |            |                  |                    |                    |
| <b>I10 268+40</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  |            |                  | <b>\$1,632,000</b> |                    |
| <b>275+20</b>          | Type 4 Structure   | <b>680</b> |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$2,720,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,768,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$2,856,000)      | G_MAG 10.0%        |
|                        |  |            |                  |                    |                    |
| <b>I10 334+90</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  |            |                  | <b>\$984,000</b>   |                    |
| <b>339+00</b>          | Type 5 Structure   | <b>410</b> |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,640,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,066,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,722,000)      | G_MAG 10.0%        |
|                        |  |            |                  |                    |                    |
| <b>I10 354+80</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  |            |                  | <b>\$972,000</b>   |                    |
| <b>358+85</b>          | Type 4 Structure   | <b>405</b> |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,620,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,053,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,701,000)      | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>I10 400+95</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>345</b> |                  | <b>\$828,000</b>   |                    |
| <b>404+40</b>          | Type 4 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,380,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3        | \$1,300          | \$897,000          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1        | \$2,100          | (\$1,449,000)      | G_MAG 10.0%        |
| <b>I10 516+50</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>330</b> |                  | <b>\$792,000</b>   |                    |
| <b>519+80</b>          | Type 4 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,320,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1        | \$2,100          | (\$1,386,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3        | \$1,300          | \$858,000          | G_MAG 10.0%        |
| <b>I10 535+45</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>340</b> |                  | <b>\$816,000</b>   |                    |
| <b>538+85</b>          | Type 4 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,360,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1        | \$2,100          | (\$1,428,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3        | \$1,300          | \$884,000          | G_MAG 10.0%        |
| <b>I10 713+20</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>680</b> |                  | <b>\$1,632,000</b> |                    |
| <b>720+00</b>          | Type 4 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$2,720,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1        | \$2,100          | (\$2,856,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3        | \$1,300          | \$1,768,000        | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>         | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |        |       |
|--------------------------------|--|------------|------------------|--------------------|--------------------|--------|-------|
| <b>I10</b><br>720+00<br>724+18 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>418</b> |                  | <b>\$1,003,200</b> |                    |        |       |
|                                | Type 5 Structure   |            |                  |                    |                    |        |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | 418              | \$4,000            | CONSTR             | 25.0%  |       |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TM1        | -836             | \$2,100            | (\$1,755,600)      | G_MAG  | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TM3        | 836              | \$1,086,800        | G_MAG              | 10.0%  |       |
| <b>I10</b><br>724+18<br>729+18 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>500</b> |                  | <b>\$1,200,000</b> |                    |        |       |
|                                | Type 4 Structure   |            |                  |                    |                    |        |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | 500              | \$4,000            | CONSTR             | 25.0%  |       |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TM3        | 1,000            | \$1,300            | \$1,300,000        | G_MAG  | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TM1        | -1,000           | \$2,100            | (\$2,100,000)      | G_MAG  | 10.0% |
| <b>I10</b><br>756+40<br>758+75 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>235</b> |                  | <b>\$564,000</b>   |                    |        |       |
|                                | Type 4 Structure   |            |                  |                    |                    |        |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | 235              | \$4,000            | \$940,000          | CONSTR | 25.0% |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TM1        | -470             | \$2,100            | (\$987,000)        | G_MAG  | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TM3        | 470              | \$1,300            | \$611,000          | G_MAG  | 10.0% |
| <b>I10</b><br>839+80<br>843+40 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>360</b> |                  | <b>\$864,000</b>   |                    |        |       |
|                                | Type 4 Structure   |            |                  |                    |                    |        |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | 360              | \$4,000            | \$1,440,000        | CONSTR | 25.0% |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TM3        | 720              | \$1,300            | \$936,000          | G_MAG  | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TM1        | -720             | \$2,100            | (\$1,512,000)      | G_MAG  | 10.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>110</b>             | <b>868+18 Right of Way - Dense Urban Corridor</b>                              | <b>2,753</b> |                  | <b>\$15,795,833</b> |                    |
| <b>895+71</b>          | Right of Way Acquisition (Dense Urban)   |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                                    | URU          | LF 2,753         | \$1,716             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                     | RDW          | LF 2,753         | \$1,544             | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                       | CMP          | LF 2,753         | \$356               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | LF 2,753         | \$2,122             | LAND 25.0%         |
| <b>110</b>             | <b>869+35 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>310</b>   |                  | <b>\$744,000</b>    |                    |
| <b>872+45</b>          | Type 4 Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure       | GMS          | LF 310           | \$4,000             | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I  | TM1          | TF -620          | \$2,100             | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III  | TM3          | TF 620           | \$1,300             | G_MAG 10.0%        |
| <b>110</b>             | <b>895+71 Right of Way - Dense Urban Corridor</b>                              | <b>3,229</b> |                  | <b>\$18,526,969</b> |                    |
| <b>928+00</b>          | Right of Way Acquisition (Dense Urban)   |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                                    | URU          | LF 3,229         | \$1,716             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                     | RDW          | LF 3,229         | \$1,544             | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                       | CMP          | LF 3,229         | \$356               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | LF 3,229         | \$2,122             | LAND 25.0%         |
| <b>110</b>             | <b>917+00 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>400</b>   |                  | <b>\$960,000</b>    |                    |
| <b>921+00</b>          | Type 4 Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure       | GMS          | LF 400           | \$4,000             | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I  | TM1          | TF -800          | \$2,100             | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III  | TM3          | TF 800           | \$1,300             | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|---|--------------|------------------|---------------------|--------------------|
| <b>110 928+00</b>      | <b>Right of Way - Dense Urban Corridor</b>                                |              |                  |                     |                    |
| <b>967+21</b>          | Right of Way Acquisition (Dense Urban)                                    | <b>3,921</b> |                  | <b>\$22,497,443</b> |                    |
|                        | 40.02 Utility Relocation along Right of Way                               | URU LF       | \$1,716          | \$6,728,436         | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                | RDW LF       | \$1,544          | \$6,055,592         | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                  | CMP LF       | \$356            | \$1,394,621         | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | LWU LF       | \$2,122          | \$8,318,794         | LAND 25.0%         |
| <b>110 966+00</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>   | <b>400</b>   |                  | <b>\$960,000</b>    |                    |
| <b>970+00</b>          | Type 4 Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure | GMS LF       | \$4,000          | \$1,600,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TM1 TF       | \$2,100          | (\$1,680,000)       | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                     | TM3 TF       | \$1,300          | \$1,040,000         | G_MAG 10.0%        |

**Subtotal Part 3: West Los Angeles to LA Union Station: \$1,096,697,195**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>            | <u>Contingency</u> |
|------------------------|---|---------------|------------------|------------------------|--------------------|
| <b>110</b>             | <b>969+00 Maglev - Elevated Section - 2 Tracks</b>                              |               |                  | <b>\$1,121,483,000</b> |                    |
| <b>1915+00</b>         | Two-Track Elevated Guideway   | <b>94,600</b> |                  |                        |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                       | LF 94,600     | \$4,500          | \$425,700,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I   | TF 189,200    | \$2,100          | \$397,320,000          | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications   | LF 94,600     | \$1,052          | \$99,519,200           | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                           | LF 94,600     | \$2,103          | \$198,943,800          | CONSTR 25.0%       |
| <b>110</b>             | <b>998+00 Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  |               |                  | <b>\$1,200,000</b>     |                    |
| <b>1003+00</b>         | Type 5 Structure  | <b>500</b>    |                  |                        |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | LF 500        | \$4,000          | \$2,000,000            | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I   | TF -1,000     | \$2,100          | (\$2,100,000)          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III   | TF 1,000      | \$1,300          | \$1,300,000            | G_MAG 10.0%        |
| <b>110</b>             | <b>1003+56 Right of Way - Freight Corridor</b>                                  |               |                  | <b>\$7,356,118</b>     |                    |
| <b>1142+25</b>         | Right of Way Acquisition (Freight)  | <b>13,869</b> |                  |                        |                    |
|                        | 40.02 Utility Relocation along Right of Way                                     | LF 0          | \$0              | \$0                    | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                      | LF 0          | \$0              | \$0                    | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                        | LF 0          | \$0              | \$0                    | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor  | LF 13,869     | \$0              | \$0                    | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | LF 13,869     | \$530            | \$7,356,118            | LAND 25.0%         |
| <b>110</b>             | <b>1019+00 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |               |                  | <b>\$720,000</b>       |                    |
| <b>1022+00</b>         | Type 4 Structure  | <b>300</b>    |                  |                        |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | LF 300        | \$4,000          | \$1,200,000            | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I   | TF -600       | \$2,100          | (\$1,260,000)          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III   | TF 600        | \$1,300          | \$780,000              | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|---|--------------|------------------|---------------------|--------------------|
| <b>I10 1044+00</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  | <b>\$480,000</b>    |                    |
| <b>1046+00</b>         | Type 4 Structure  | <b>200</b>   |                  |                     |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF 200       | \$4,000          | \$800,000           | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type I   | TF -400      | \$2,100          | (\$840,000)         | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type III   | TF 400       | \$1,300          | \$520,000           | G_MAG 10.0%        |
| <b>I10 1067+00</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  | <b>\$1,200,000</b>  |                    |
| <b>1072+00</b>         | Type 4 Structure  | <b>500</b>   |                  |                     |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF 500       | \$4,000          | \$2,000,000         | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TF 1,000     | \$1,300          | \$1,300,000         | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TF -1,000    | \$2,100          | (\$2,100,000)       | G_MAG 10.0%        |
| <b>I10 1142+25</b>     | <b>Right of Way - Urban Corridor</b>                                    |              |                  | <b>\$13,104,988</b> |                    |
| <b>1180+00</b>         | Right of Way Acquisition  | <b>3,775</b> |                  |                     |                    |
| 40.02                  | Utility Relocation along Right of Way                                   | LF 3,775     | \$1,144          | \$4,318,600         | CONSTR 25.0%       |
| 40.07                  | Roadway Improvements on Right of Way                                    | LF 3,775     | \$1,030          | \$3,886,740         | CONSTR 25.0%       |
| 40.08                  | Traffic Protection and Control During Construction                      | LF 3,775     | \$237            | \$895,128           | CONSTR 25.0%       |
| 60.01                  | Right of Way Acquisition  | LF 3,775     | \$1,061          | \$4,004,520         | LAND 25.0%         |
| <b>I10 1159+40</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  | <b>\$924,000</b>    |                    |
| <b>1163+25</b>         | Type 4 Structure  | <b>385</b>   |                  |                     |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF 385       | \$4,000          | \$1,540,000         | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TF 770       | \$1,300          | \$1,001,000         | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TF -770      | \$2,100          | (\$1,617,000)       | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|---|------------|------------------|--------------------|--------------------|
| <b>I10 1167+15</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>130</b> |                  | <b>\$312,000</b>   |                    |
| <b>1168+45</b>         | Type 5 Structure  |            |                  |                    |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$520,000          | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$338,000          | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$546,000)        | G_MAG 10.0%        |
| <b>I10 1182+15</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>240</b> |                  | <b>\$576,000</b>   |                    |
| <b>1184+55</b>         | Type 4 Structure  |            |                  |                    |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$960,000          | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$624,000          | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,008,000)      | G_MAG 10.0%        |
| <b>I10 1186+55</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>680</b> |                  | <b>\$1,632,000</b> |                    |
| <b>1193+35</b>         | Type 4 Structure  |            |                  |                    |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$2,720,000        | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$1,768,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$2,856,000)      | G_MAG 10.0%        |
| <b>I10 1197+40</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>100</b> |                  | <b>\$240,000</b>   |                    |
| <b>1198+40</b>         | Type 5 Structure  |            |                  |                    |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$400,000          | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$420,000)        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$260,000          | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>      | <u>Contingency</u> |
|------------------------|---|------------|------------------|------------------|--------------------|
| <b>I10 1200+40</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>270</b> |                  | <b>\$648,000</b> |                    |
| <b>1203+10</b>         | Type 5 Structure  |            |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$1,080,000      | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$702,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,134,000)    | G_MAG 10.0%        |
|                        |   |            |                  |                  |                    |
| <b>I10 1210+10</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>360</b> |                  | <b>\$864,000</b> |                    |
| <b>1213+70</b>         | Type 4 Structure  |            |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$1,440,000      | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$936,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,512,000)    | G_MAG 10.0%        |
|                        |   |            |                  |                  |                    |
| <b>I10 1268+55</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>205</b> |                  | <b>\$492,000</b> |                    |
| <b>1270+60</b>         | Type 4 Structure  |            |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$820,000        | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$533,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$861,000)      | G_MAG 10.0%        |
|                        |   |            |                  |                  |                    |
| <b>I10 1559+10</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>340</b> |                  | <b>\$816,000</b> |                    |
| <b>1562+50</b>         | Type 4 Structure  |            |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$1,360,000      | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$884,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,428,000)    | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|---|--------------|------------------|--------------------|--------------------|
| <b>110</b>             | <b>1561+50 Right of Way - Urban Corridor</b>                                    |              |                  |                    |                    |
| <b>1578+45</b>         | Right of Way Acquisition  | <b>1,695</b> |                  | <b>\$5,884,226</b> |                    |
|                        | 40.02 Utility Relocation along Right of Way                                     | URU          | LF               | 1,144              | CONSTR             |
|                        | 40.07 Roadway Improvements on Right of Way                                      | RDW          | LF               | 1,695              | CONSTR             |
|                        | 40.08 Traffic Protection and Control During Construction                        | CMP          | LF               | \$237              | CONSTR             |
|                        | 60.01 Right of Way Acquisition  | LWU          | LF               | \$1,061            | LAND               |
| <b>110</b>             | <b>1583+05 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  | <b>\$324,000</b>   |                    |
| <b>1584+40</b>         | Type 5 Structure  | <b>135</b>   |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | GMS          | LF               | \$4,000            | CONSTR             |
|                        | 10.09 Guideway Beams (Track) Type III   | TM3          | TF               | \$1,300            | G_MAG              |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1          | TF               | \$2,100            | G_MAG              |
| <b>110</b>             | <b>1601+00 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  | <b>\$780,000</b>   |                    |
| <b>1604+25</b>         | Type 4 Structure  | <b>325</b>   |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | GMS          | LF               | \$4,000            | CONSTR             |
|                        | 10.09 Guideway Beams (Track) Type III   | TM3          | TF               | \$1,300            | G_MAG              |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1          | TF               | \$2,100            | G_MAG              |
| <b>110</b>             | <b>1678+10 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  | <b>\$1,152,000</b> |                    |
| <b>1682+90</b>         | Type 5 Structure  | <b>480</b>   |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | GMS          | LF               | \$4,000            | CONSTR             |
|                        | 10.09 Guideway Beams (Track) Type III   | TM3          | TF               | \$1,300            | G_MAG              |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1          | TF               | \$2,100            | G_MAG              |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|---|--------------|------------------|--------------------|--------------------|
| <b>110</b>             | <b>1692+00 Right of Way - Urban Corridor</b>                                    |              |                  |                    |                    |
| <b>1708+76</b>         | Right of Way Acquisition  | <b>1,676</b> |                  | <b>\$5,818,268</b> |                    |
|                        | 40.02 Utility Relocation along Right of Way                                     | URU          | LF               | 1,676              | 25.0%              |
|                        | 40.07 Roadway Improvements on Right of Way                                      | RDW          | LF               | 1,676              | 25.0%              |
|                        | 40.08 Traffic Protection and Control During Construction                        | CMP          | LF               | \$237              | 25.0%              |
|                        | 60.01 Right of Way Acquisition  | LWU          | LF               | \$1,061            | 25.0%              |
| <b>110</b>             | <b>1697+80 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  |                    |                    |
| <b>1705+55</b>         | Type 4 Structure  | <b>775</b>   |                  | <b>\$1,860,000</b> |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | GMS          | LF               | 775                | 25.0%              |
|                        | 10.09 Guideway Beams (Track) Type III   | TM3          | TF               | 1,550              | 10.0%              |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1          | TF               | -1,550             | 10.0%              |
| <b>110</b>             | <b>1713+65 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  |                    |                    |
| <b>1716+90</b>         | Type 4 Structure  | <b>325</b>   |                  | <b>\$780,000</b>   |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | GMS          | LF               | 325                | 25.0%              |
|                        | 10.09 Guideway Beams (Track) Type III   | TM3          | TF               | 650                | 10.0%              |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1          | TF               | -650               | 10.0%              |
| <b>110</b>             | <b>1724+80 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |              |                  |                    |                    |
| <b>1728+10</b>         | Type 4 Structure  | <b>330</b>   |                  | <b>\$792,000</b>   |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | GMS          | LF               | 330                | 25.0%              |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1          | TF               | -660               | 10.0%              |
|                        | 10.09 Guideway Beams (Track) Type III   | TM3          | TF               | 660                | 10.0%              |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>      | <u>Contingency</u> |
|------------------------|---|------------|------------------|------------------|--------------------|
| <b>I10 1770+70</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |            |                  | <b>\$744,000</b> |                    |
| <b>1773+80</b>         | Type 4 Structure  | <b>310</b> |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$1,240,000      | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$806,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,302,000)    | G_MAG 10.0%        |
| <b>I10 1792+00</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |            |                  | <b>\$720,000</b> |                    |
| <b>1795+00</b>         | Type 4 Structure  | <b>300</b> |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$1,200,000      | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$780,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,260,000)    | G_MAG 10.0%        |
| <b>I10 1802+75</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |            |                  | <b>\$876,000</b> |                    |
| <b>1806+40</b>         | Type 4 Structure  | <b>365</b> |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$1,460,000      | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$949,000        | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,533,000)    | G_MAG 10.0%        |
| <b>I10 1808+00</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |            |                  | <b>\$960,000</b> |                    |
| <b>1812+00</b>         | Type 4 Structure  | <b>400</b> |                  |                  |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF         | \$4,000          | \$1,600,000      | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TM3        | \$1,300          | \$1,040,000      | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TM1        | \$2,100          | (\$1,680,000)    | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u>           | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|----------------------------------|---|--------------|------------------|--------------------|--------------------|
| <b>110</b><br>1830+80<br>1834+00 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b><br>Type 4 Structure | <b>320</b>   |                  | <b>\$768,000</b>   |                    |
|                                  | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure                   | LF 320       | \$4,000          | \$1,280,000        | CONSTR 25.0%       |
|                                  | 10.09 Guideway Beams (Track) Type III   | TF 640       | \$1,300          | \$832,000          | G_MAG 10.0%        |
|                                  | 10.09 Guideway Beams (Track) Type I   | TF -640      | \$2,100          | (\$1,344,000)      | G_MAG 10.0%        |
| <b>110</b><br>1892+00<br>1915+00 | <b>Right of Way - Urban Corridor</b><br>Right of Way Acquisition                            | <b>2,300</b> |                  | <b>\$7,984,496</b> |                    |
|                                  | 40.02 Utility Relocation along Right of Way   | URU LF 2,300 | \$1,144          | \$2,631,200        | CONSTR 25.0%       |
|                                  | 40.07 Roadway Improvements on Right of Way  | RDW LF 2,300 | \$1,030          | \$2,368,080        | CONSTR 25.0%       |
|                                  | 40.08 Traffic Protection and Control During Construction                                    | CMP LF 2,300 | \$237            | \$545,376          | CONSTR 25.0%       |
|                                  | 60.01 Right of Way Acquisition  | LWU LF 2,300 | \$1,061          | \$2,439,840        | LAND 25.0%         |

**Subtotal Part 2: Interstate 10 Freeway: \$1,181,491,096**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |        |       |
|------------------------|---|---------------|------------------|----------------------|--------------------|--------|-------|
| <b>I10</b>             | <b>1915+00 Maglev - Elevated Section - 2 Tracks</b>                             | <b>0</b>      |                  | <b>\$0</b>           |                    |        |       |
| <b>1933+36</b>         | Two-Track Elevated Guideway   |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                       | GME           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1           | TF               | 0                    | \$0                | G_MAG  | 10.0% |
|                        | 50.01 Maglev Signals and Communications   | YMM           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                           | PMM           | LF               | 0                    | \$0                | CONSTR | 25.0% |
| <b>I10</b>             | <b>1915+00 Maglev - Elevated Section - 2 Tracks</b>                             | <b>25,100</b> |                  | <b>\$297,560,500</b> |                    |        |       |
| <b>2166+00</b>         | Two-Track Elevated Guideway   |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                       | GME           | LF               | 25,100               | \$4,500            | CONSTR | 25.0% |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1           | TF               | 50,200               | \$2,100            | G_MAG  | 10.0% |
|                        | 50.01 Maglev Signals and Communications   | YMM           | LF               | 25,100               | \$1,052            | CONSTR | 25.0% |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                           | PMM           | LF               | 25,100               | \$2,103            | CONSTR | 25.0% |
| <b>I10</b>             | <b>1944+00 Right of Way - Urban Corridor</b>                                    | <b>1,961</b>  |                  | <b>\$6,807,651</b>   |                    |        |       |
| <b>1963+61</b>         | Right of Way Acquisition  |               |                  |                      |                    |        |       |
|                        | 40.02 Utility Relocation along Right of Way                                     | URU           | LF               | 1,961                | \$1,144            | CONSTR | 25.0% |
|                        | 40.07 Roadway Improvements on Right of Way                                      | RDW           | LF               | 1,961                | \$1,030            | CONSTR | 25.0% |
|                        | 40.08 Traffic Protection and Control During Construction                        | CMP           | LF               | 1,961                | \$237              | CONSTR | 25.0% |
|                        | 60.01 Right of Way Acquisition  | LWU           | LF               | 1,961                | \$1,061            | LAND   | 25.0% |
| <b>I10</b>             | <b>2076+00 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>235</b>    |                  | <b>\$564,000</b>     |                    |        |       |
| <b>2078+35</b>         | Type 5 Structure  |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure        | GMS           | LF               | 235                  | \$4,000            | CONSTR | 25.0% |
|                        | 10.09 Guideway Beams (Track) Type III   | TM3           | TF               | 470                  | \$1,300            | G_MAG  | 10.0% |
|                        | 10.09 Guideway Beams (Track) Type I   | TM1           | TF               | -470                 | \$2,100            | G_MAG  | 10.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|---|--------------|------------------|---------------------|--------------------|
| <b>I10 2125+65</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>   |              |                  | <b>\$804,000</b>    |                    |
| <b>2129+00</b>         | Type 4 Structure  | <b>335</b>   |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure | LF           | \$4,000          | \$1,340,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                     | TF           | \$1,300          | \$871,000           | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF           | \$2,100          | (\$1,407,000)       | G_MAG 10.0%        |
| <b>I10 2159+50</b>     | <b>Right of Way - Urban Corridor</b>                                      | <b>921</b>   |                  | <b>\$3,197,271</b>  |                    |
| <b>2168+71</b>         | Right of Way Acquisition  |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                               | URU          | \$1,144          | \$1,053,624         | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                | RDW          | \$1,030          | \$948,262           | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                  | CMP          | \$237            | \$218,388           | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | LWU          | \$1,061          | \$976,997           | LAND 25.0%         |
| <b>I10 2166+00</b>     | <b>Maglev - Retained Cut Section - 2 Tracks</b>                           | <b>200</b>   |                  | <b>\$2,911,000</b>  |                    |
| <b>2168+00</b>         | Type 6 Structure (Retained Cut)   |              |                  |                     |                    |
|                        | 10.08 Retained Maglev Section (One Side)                                  | GMR          | \$8,800          | \$1,760,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                     | TM3          | \$1,300          | \$520,000           | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                   | YMM          | \$1,052          | \$210,400           | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                     | PMM          | \$2,103          | \$420,600           | CONSTR 25.0%       |
| <b>I10 2168+00</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>                               | <b>1,750</b> |                  | <b>\$20,746,250</b> |                    |
| <b>2185+50</b>         | Two-Track Elevated Guideway   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                 | GME          | \$4,500          | \$7,875,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TM1          | \$2,100          | \$7,350,000         | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                   | YMM          | \$1,052          | \$1,841,000         | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                     | PMM          | \$2,103          | \$3,680,250         | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>I10 2180+00</b>     | <b>Right of Way - Urban Corridor</b>                     | <b>500</b>   |                  | <b>\$1,735,760</b>  |                    |
| <b>2185+00</b>         | Right of Way Acquisition                                 |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way              | 500          | LF               | \$1,144             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way               | 500          | LF               | \$1,030             | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction | 500          | LF               | \$237               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition                           | 500          | LF               | \$1,061             | LAND 25.0%         |
| <b>I10 2185+50</b>     | <b>Maglev - Retained Cut Section - 2 Tracks</b>          | <b>550</b>   |                  | <b>\$8,005,250</b>  |                    |
| <b>2191+00</b>         | Type 6 Structure (Retained Cut)                          |              |                  |                     |                    |
|                        | 10.08 Retained Maglev Section (One Side)                 | 550          | LF               | \$8,800             | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                    | 1,100        | TF               | \$1,300             | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                  | 550          | LF               | \$1,052             | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)    | 550          | LF               | \$2,103             | CONSTR 25.0%       |
| <b>I10 2191+00</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>              | <b>4,000</b> |                  | <b>\$47,420,000</b> |                    |
| <b>2231+00</b>         | Two-Track Elevated Guideway                              |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                | 4,000        | LF               | \$4,500             | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                      | 8,000        | TF               | \$2,100             | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                  | 4,000        | LF               | \$1,052             | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)    | 4,000        | LF               | \$2,103             | CONSTR 25.0%       |
| <b>I10 2212+00</b>     | <b>Right of Way - Urban Corridor</b>                     | <b>800</b>   |                  | <b>\$2,777,216</b>  |                    |
| <b>2220+00</b>         | Right of Way Acquisition                                 |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way              | 800          | LF               | \$1,144             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way               | 800          | LF               | \$1,030             | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction | 800          | LF               | \$237               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition                           | 800          | LF               | \$1,061             | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>I10 2225+00</b>     | <b>Right of Way - Urban Corridor</b>                     | <b>100</b>    |                  | <b>\$347,152</b>     |                    |
| <b>2226+00</b>         | Right of Way Acquisition                                 |               |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way              | 100           | LF               | \$1,144              | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way               | 100           | LF               | \$1,030              | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction | 100           | LF               | \$237                | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition                           | 100           | LF               | \$1,061              | LAND 25.0%         |
|                        |  |               |                  |                      |                    |
| <b>I10 2231+00</b>     | <b>Maglev - Retained Cut Section - 2 Tracks</b>          | <b>1,600</b>  |                  | <b>\$23,288,000</b>  |                    |
| <b>2247+00</b>         | Type 6 Structure (Retained Cut)                          |               |                  |                      |                    |
|                        | 10.08 Retained Maglev Section (One Side)                 | 1,600         | LF               | \$8,800              | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                    | 3,200         | TF               | \$1,300              | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                  | 1,600         | LF               | \$1,052              | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)    | 1,600         | LF               | \$2,103              | CONSTR 25.0%       |
|                        |  |               |                  |                      |                    |
| <b>I10 2247+00</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>              | <b>73,400</b> |                  | <b>\$870,157,000</b> |                    |
| <b>2981+00</b>         | Two-Track Elevated Guideway                              |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                | 73,400        | LF               | \$4,500              | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                      | 146,800       | TF               | \$2,100              | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                  | 73,400        | LF               | \$1,052              | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)    | 73,400        | LF               | \$2,103              | CONSTR 25.0%       |
|                        |  |               |                  |                      |                    |
| <b>I10 2265+00</b>     | <b>Right of Way - Urban Corridor</b>                     | <b>3,300</b>  |                  | <b>\$11,456,016</b>  |                    |
| <b>2298+00</b>         | Right of Way Acquisition                                 |               |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way              | 3,300         | LF               | \$1,144              | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way               | 3,300         | LF               | \$1,030              | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction | 3,300         | LF               | \$237                | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition                           | 3,300         | LF               | \$1,061              | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|---|---------------|------------------|---------------------|--------------------|
| <b>I10 2309+15</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |               |                  | <b>\$1,464,000</b>  |                    |
| <b>2315+25</b>         | Type 4 Structure  | <b>610</b>    |                  |                     |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF            | \$4,000          | \$2,440,000         | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TF            | \$1,300          | \$1,586,000         | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TF            | \$2,100          | (\$2,562,000)       | G_MAG 10.0%        |
| <b>I10 2337+55</b>     | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b> |               |                  | <b>\$1,620,000</b>  |                    |
| <b>2344+30</b>         | Type 4 Structure  | <b>675</b>    |                  |                     |                    |
| 10.04                  | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure      | LF            | \$4,000          | \$2,700,000         | CONSTR 25.0%       |
| 10.09                  | Guideway Beams (Track) Type III   | TF            | \$1,300          | \$1,755,000         | G_MAG 10.0%        |
| 10.09                  | Guideway Beams (Track) Type I   | TF            | \$2,100          | (\$2,835,000)       | G_MAG 10.0%        |
| <b>I10 2381+76</b>     | <b>Right of Way - Urban Corridor</b>                                    | <b>324</b>    |                  | <b>\$1,124,772</b>  |                    |
| <b>2385+00</b>         | Right of Way Acquisition  |               |                  |                     |                    |
| 40.02                  | Utility Relocation along Right of Way                                   | LF            | \$1,144          | \$370,656           | CONSTR 25.0%       |
| 40.07                  | Roadway Improvements on Right of Way                                    | LF            | \$1,030          | \$333,590           | CONSTR 25.0%       |
| 40.08                  | Traffic Protection and Control During Construction                      | LF            | \$237            | \$76,827            | CONSTR 25.0%       |
| 60.01                  | Right of Way Acquisition  | LF            | \$1,061          | \$343,699           | LAND 25.0%         |
| <b>I10 2385+00</b>     | <b>Right of Way - Freight Corridor</b>                                  | <b>43,500</b> |                  | <b>\$23,072,400</b> |                    |
| <b>2820+00</b>         | Right of Way Acquisition (Freight)                                      |               |                  |                     |                    |
| 40.02                  | Utility Relocation along Right of Way                                   | LF            | \$0              | \$0                 | CONSTR 25.0%       |
| 40.07                  | Roadway Improvements on Right of Way                                    | LF            | \$0              | \$0                 | CONSTR 25.0%       |
| 40.08                  | Flagging in Freight Corridor  | LF            | \$0              | \$0                 | CONSTR 25.0%       |
| 40.08                  | Traffic Protection and Control During Construction                      | LF            | \$0              | \$0                 | CONSTR 25.0%       |
| 60.01                  | Right of Way Acquisition  | LF            | \$530            | \$23,072,400        | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>I10</b>             | <b>2540+00</b>   |              |                  |                     |                    |
| <b>2544+00</b>         | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>400</b>   |                  | <b>\$960,000</b>    |                    |
|                        | Type 4 Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF           | \$4,000          | \$1,600,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3          | \$1,300          | \$1,040,000         | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1          | \$2,100          | (\$1,680,000)       | G_MAG 10.0%        |
| <b>I10</b>             | <b>2857+19</b>   |              |                  |                     |                    |
| <b>2860+45</b>         | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>326</b>   |                  | <b>\$782,400</b>    |                    |
|                        | Type 5 Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF           | \$4,000          | \$1,304,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3          | \$1,300          | \$847,600           | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1          | \$2,100          | (\$1,369,200)       | G_MAG 10.0%        |
| <b>I10</b>             | <b>2864+00</b>   |              |                  |                     |                    |
| <b>2947+51</b>         | <b>Right of Way - Urban Corridor</b>                                     | <b>8,351</b> |                  | <b>\$28,990,664</b> |                    |
|                        | Right of Way Acquisition (Airport Property)                              |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                              | URU          | \$1,144          | \$9,553,544         | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                               | RDW          | \$1,030          | \$8,598,190         | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                 | CMP          | \$237            | \$1,980,189         | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | \$1,061          | \$8,858,741         | LAND 25.0%         |
| <b>I10</b>             | <b>2892+03</b>   |              |                  |                     |                    |
| <b>2895+18</b>         | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>315</b>   |                  | <b>\$756,000</b>    |                    |
|                        | Type 4 Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF           | \$4,000          | \$1,260,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3          | \$1,300          | \$819,000           | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1          | \$2,100          | (\$1,323,000)       | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u>               | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|--------------------------------------|---|--------------|------------------|---------------------|--------------------|
| <b>I10 2937+58</b><br><b>2940+70</b> | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b><br>Type 4 Structure | <b>312</b>   |                  | <b>\$748,800</b>    |                    |
|                                      | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure                    | 312          | LF \$4,000       | \$1,248,000         | CONSTR 25.0%       |
|                                      | 10.09 Guideway Beams (Track) Type III   | 624          | TF \$1,300       | \$811,200           | G_MAG 10.0%        |
|                                      | 10.09 Guideway Beams (Track) Type I   | -624         | TF \$2,100       | (\$1,310,400)       | G_MAG 10.0%        |
| <b>I10 2947+51</b><br><b>2981+00</b> | <b>Right of Way - Urban Corridor</b><br>Right of Way Acquisition (Airport Property)         | <b>3,349</b> |                  | <b>\$11,626,120</b> |                    |
|                                      | 40.02 Utility Relocation along Right of Way   | 3,349        | LF \$1,144       | \$3,831,256         | CONSTR 25.0%       |
|                                      | 40.07 Roadway Improvements on Right of Way  | 3,349        | LF \$1,030       | \$3,448,130         | CONSTR 25.0%       |
|                                      | 40.08 Traffic Protection and Control During Construction                                    | 3,349        | LF \$237         | \$794,115           | CONSTR 25.0%       |
|                                      | 60.01 Right of Way Acquisition  | 3,349        | LF \$1,061       | \$3,552,619         | LAND 25.0%         |

|                                      |   |          |            |                |              |
|--------------------------------------|---|----------|------------|----------------|--------------|
| <b>I10 2956+11</b><br><b>2981+00</b> | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b><br>Segment at Ontario Airport | <b>1</b> |            | <b>\$2,400</b> |              |
|                                      | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure                              | 1        | LF \$4,000 | \$4,000        | CONSTR 25.0% |
|                                      | 10.09 Guideway Beams (Track) Type III   | 2        | TF \$1,300 | \$2,600        | G_MAG 10.0%  |
|                                      | 10.09 Guideway Beams (Track) Type I   | -2       | TF \$2,100 | (\$4,200)      | G_MAG 10.0%  |

**Subtotal Part 1: I10 to Ontario Airport: \$1,368,924,622**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Ontario Airport Station

| <u>Station From/To</u>                   | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|--|--|--------------|------------------|----------------------|--------------------|
| <b>110 2947+51</b>                       | <b>Elevated Station (Center-Side Platform)</b>               | <b>1</b>     |                  | <b>\$94,138,000</b>  |                    |
| <b>2956+11</b>                           | Ontario Airport Station                                      |              |                  |                      |                    |
|  | 20.02 Elevated Station - Center-Side Platform with Mezzanine | EA           | \$85,800,000     | \$85,800,000         | CONSTR 25.0%       |
| 60.01                                    | Land Acquisition for Yards and Stations                      | SF           | \$20             | \$1,880,000          | LAND 25.0%         |
| 60.01                                    | Land Acquisition for Yards and Stations                      | SF           | \$20             | \$6,458,000          | LAND 25.0%         |
| <b>110 2947+51</b>                       | <b>Parking Deck Spaces</b>                                   | <b>2,000</b> |                  | <b>\$44,710,000</b>  |                    |
| <b>2956+11</b>                           | Parking at Ontario Airport                                   |              |                  |                      |                    |
|  | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$40,950,000         | CONSTR 25.0%       |
| 60.01                                    | Land Acquisition for Yards and Stations                      | SF           | \$20             | \$3,760,000          | LAND 25.0%         |
| <b>Subtotal Ontario Airport Station:</b> |  |              |                  | <b>\$138,848,000</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Stations - Maglev Alignment

| <u>Station From/To</u>           | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|----------------------------------|--|------------|------------------|---------------------|--------------------|
| <b>I10</b><br>107+06<br>113+86   | <b>Elevated Station (Center Platform)</b>                    | 1          |                  | <b>\$53,386,000</b> |                    |
|                                  | West Los Angeles Station                                     |            |                  |                     |                    |
|                                  | 20.02 Elevated Station - Center Platform                     | 1          | \$47,200,000     | \$47,200,000        | CONSTR 25.0%       |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 215,300 | \$20             | \$4,306,000         | LAND 25.0%         |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 94,000  | \$20             | \$1,880,000         | LAND 25.0%         |
| <b>I10</b><br>107+06<br>113+86   | <b>Parking Deck Spaces</b>                                   | 1,000      |                  | <b>\$22,355,000</b> |                    |
|                                  | Parking at West Los Angeles Station                          |            |                  |                     |                    |
|                                  | 20.06 Parking Space - Deck                                   | 1,000      | \$20,475         | \$20,475,000        | CONSTR 25.0%       |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 94,000  | \$20             | \$1,880,000         | LAND 25.0%         |
| <b>I10</b><br>1926+56<br>1933+36 | <b>Elevated Station (Center Platform)</b>                    | 1          |                  | <b>\$53,386,000</b> |                    |
|                                  | West Covina Station  |            |                  |                     |                    |
|                                  | 20.02 Elevated Station - Center Platform                     | 1          | \$47,200,000     | \$47,200,000        | CONSTR 25.0%       |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 215,300 | \$20             | \$4,306,000         | LAND 25.0%         |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 94,000  | \$20             | \$1,880,000         | LAND 25.0%         |
| <b>I10</b><br>1926+56<br>1933+36 | <b>Parking Deck Spaces</b>                                   | 2,000      |                  | <b>\$44,710,000</b> |                    |
|                                  | Parking at West Covina Station                               |            |                  |                     |                    |
|                                  | 20.06 Parking Space - Deck                                   | 2,000      | \$20,475         | \$40,950,000        | CONSTR 25.0%       |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 188,000 | \$20             | \$3,760,000         | LAND 25.0%         |
| <b>UP1B</b><br>21+00<br>21+00    | <b>Elevated Station (Center-Side Platform)</b>               | 1          |                  | <b>\$94,138,000</b> |                    |
|                                  | LA Union Station   |            |                  |                     |                    |
|                                  | 20.02 Elevated Station - Center-Side Platform with Mezzanine | 1          | \$85,800,000     | \$85,800,000        | CONSTR 25.0%       |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 322,900 | \$20             | \$6,458,000         | LAND 25.0%         |
|                                  | 60.01 Land Acquisition for Yards and Stations                | SF 94,000  | \$20             | \$1,880,000         | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Stations - Maglev Alignment

| <u>Station From/To</u> | <u>Cost Item</u> | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|------------------------|------------------|------------|------------------|-------------|--------------------|
|------------------------|------------------|------------|------------------|-------------|--------------------|

Subtotal Stations - Maglev Alignment: \$267,975,000

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### Ontario Maintenance Facility

| <u>Station From/To</u>                        | <u>Cost Item</u>                        | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|---|---|------------|------------------|----------------------|--------------------|
| <b>Maglev - Central Maintenance Facility</b>  |   |            |                  |                      |                    |
|   | Central Maintenance Facility - Maglev   | 1          |                  | \$175,200,000        |                    |
| 30.02   | Maglev Vehicle Equipment                | 1          | \$70,000,000     | \$70,000,000         | 25.0%              |
| 30.02   | Maglev Centralized Maintenance Facility | 1          | \$97,700,000     | \$97,700,000         | 25.0%              |
| 30.02   | Maglev Train Wash Facility              | 1          | \$7,500,000      | \$7,500,000          | 25.0%              |
| <b>Subtotal Ontario Maintenance Facility:</b> |   |            |                  | <b>\$175,200,000</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on I-10 Alignment

### West Los Angeles Yard

| <u>Station From/To</u> | <u>Cost Item</u>                                   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>                            | <u>Contingency</u>  |
|------------------------|--|------------|------------------|--|---------------------|
|                        | <b>Maglev - Decentralized Maintenance Facility</b> | 1          |                  | <b>\$29,200,000</b>                    |                     |
|                        | Decentral Maintenance Facility - Maglev            |            |                  |  |                     |
| 30.02                  | Maglev Decentral Maintenance Facility              | MIF        | EA               | 1 \$29,200,000                         | CONSTR 25.0%        |
|                        |  |            |                  | <b>Subtotal West Los Angeles Yard:</b> | <b>\$29,200,000</b> |

# *SCAG High Speed Regional Transportation Systems Alternatives Analysis Study*

## *Takeoff Details with Unit Costs*

Maglev on I-10 Alignment

**Revenue Fleet**

| <u>Station From/To</u>         | <u>Cost Item</u>        | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|--------------------------------|-------------------------|------------|------------------|----------------------|--------------------|
|                                | <b>Maglev Trainsets</b> | <b>7</b>   |                  | <b>\$448,875,000</b> |                    |
|                                | Maglev Trainsets        |            |                  |                      |                    |
| 70.03                          | Maglev Train Sets       | VTM        | EA               | 7 \$64,125,000       | VEH_MAG 10.0%      |
| <b>Subtotal Revenue Fleet:</b> |                         |            |                  | <b>\$448,875,000</b> |                    |

**Total Maglev on I-10 Alignment: \$4,707,210,913**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u>   |               |        |       |
|------------------------|---|---------------|------------------|---------------------|----------------------|---------------|--------|-------|
| <b>I10</b>             | <b>82+50 HSR - Drill Track - West Los Angeles</b>                       | <b>1</b>      |                  | <b>\$14,491,200</b> |                      |               |        |       |
| <b>106+50</b>          | Drill track beyond WLA station  |               |                  |                     |                      |               |        |       |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                  | GRE           | LF               | 2,400               | \$4,500              | \$10,800,000  | CONSTR | 25.0% |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                 | TRD           | TF               | 4,800               | \$305                | \$1,464,000   | LOW    | 10.0% |
|                        | 50.01 HSR Signaling (ATC)   | YRA           | LF               | 2,400               | \$275                | \$660,000     | CONSTR | 25.0% |
|                        | 50.01 HSR Wayside Protection System                                     | YRW           | LF               | 2,400               | \$22                 | \$52,800      | CONSTR | 25.0% |
|                        | 50.03 HSR Traction Power Supply   | PRS           | LF               | 2,400               | \$141                | \$338,400     | CONSTR | 25.0% |
|                        | 50.04 HSR Traction Power Distribution                                   | PRD           | LF               | 2,400               | \$262                | \$628,800     | CONSTR | 25.0% |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                       | CR1           | LF               | 2,400               | \$228                | \$547,200     | CONSTR | 25.0% |
| <b>I10</b>             | <b>106+50 HSR Elevated Section (Urban Aerial) - 2 Tracks</b>            | <b>86,250</b> |                  |                     | <b>\$520,777,500</b> |               |        |       |
| <b>969+00</b>          | Urban Aerial Adjacent to Highway Corridor                               |               |                  |                     |                      |               |        |       |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                  | GRE           | LF               | 86,250              | \$4,500              | \$388,125,000 | CONSTR | 25.0% |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                 | TRD           | TF               | 172,500             | \$305                | \$52,612,500  | LOW    | 10.0% |
|                        | 50.01 HSR Wayside Protection System                                     | YRW           | LF               | 86,250              | \$22                 | \$1,897,500   | CONSTR | 25.0% |
|                        | 50.01 HSR Signaling (ATC)   | YRA           | LF               | 86,250              | \$275                | \$23,718,750  | CONSTR | 25.0% |
|                        | 50.03 HSR Traction Power Supply   | PRS           | LF               | 86,250              | \$141                | \$12,161,250  | CONSTR | 25.0% |
|                        | 50.04 HSR Traction Power Distribution                                   | PRD           | LF               | 86,250              | \$262                | \$22,597,500  | CONSTR | 25.0% |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                       | CR1           | LF               | 86,250              | \$228                | \$19,665,000  | CONSTR | 25.0% |
| <b>I10</b>             | <b>123+80 Additional for Long Crossing</b>                              | <b>330</b>    |                  |                     | <b>\$2,574,000</b>   |               |        |       |
| <b>127+10</b>          | Long Span Structure   |               |                  |                     |                      |               |        |       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | GRL           | LF               | 330                 | \$7,800              | \$2,574,000   | CONSTR | 25.0% |
| <b>I10</b>             | <b>148+08 Additional for High Elevated Structure</b>                    | <b>1,492</b>  |                  |                     | <b>\$1,342,800</b>   |               |        |       |
| <b>163+00</b>          | High Structure  |               |                  |                     |                      |               |        |       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for High Structure      | GRH           | LF               | 1,492               | \$900                | \$1,342,800   | CONSTR | 25.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>  | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|-------------------------|--|------------|------------------|--------------------|--------------------|
| 110<br>153+80<br>157+60 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 380        |                  | <b>\$2,964,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 380 LF     | \$7,800          | \$2,964,000        | CONSTR 25.0%       |
| 110<br>189+55<br>193+20 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 365        |                  | <b>\$2,847,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 365 LF     | \$7,800          | \$2,847,000        | CONSTR 25.0%       |
| 110<br>235+10<br>238+65 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 355        |                  | <b>\$2,769,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 355 LF     | \$7,800          | \$2,769,000        | CONSTR 25.0%       |
| 110<br>268+40<br>275+20 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 680        |                  | <b>\$5,304,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 680 LF     | \$7,800          | \$5,304,000        | CONSTR 25.0%       |
| 110<br>334+90<br>339+00 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 410        |                  | <b>\$3,198,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 410 LF     | \$7,800          | \$3,198,000        | CONSTR 25.0%       |
| 110<br>354+80<br>358+85 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 405        |                  | <b>\$3,159,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 405 LF     | \$7,800          | \$3,159,000        | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>  | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|-------------------------|--|------------|------------------|--------------------|--------------------|
| 110<br>400+95<br>404+40 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 345        |                  | <b>\$2,691,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | LF         | \$7,800          | \$2,691,000        | CONSTR 25.0%       |
| 110<br>516+50<br>519+80 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 330        |                  | <b>\$2,574,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF     | \$7,800          | \$2,574,000        | CONSTR 25.0%       |
| 110<br>535+45<br>538+85 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 340        |                  | <b>\$2,652,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF     | \$7,800          | \$2,652,000        | CONSTR 25.0%       |
| 110<br>713+20<br>720+00 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 680        |                  | <b>\$5,304,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF     | \$7,800          | \$5,304,000        | CONSTR 25.0%       |
| 110<br>720+00<br>724+18 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 418        |                  | <b>\$3,260,400</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF     | \$7,800          | \$3,260,400        | CONSTR 25.0%       |
| 110<br>722+50<br>742+00 | <b>Additional for High Elevated Structure</b><br>High Structure        | 1,950      |                  | <b>\$1,755,000</b> |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH LF     | \$900            | \$1,755,000        | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>  | <u>Contingency</u> |
|------------------------|--|--------------|------------------|--------------|--------------------|
| 110                    | 724+18 Additional for Long Crossing                                    | 500          |                  | \$3,900,000  |                    |
|                        | 729+18 Long Span Structure   |              |                  |              |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF 500   | \$7,800          | \$3,900,000  | CONSTR 25.0%       |
| 110                    | 756+40 Additional for Long Crossing                                    | 235          |                  | \$1,833,000  |                    |
|                        | 758+75 Long Span Structure   |              |                  |              |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF 235   | \$7,800          | \$1,833,000  | CONSTR 25.0%       |
| 110                    | 839+80 Additional for Long Crossing                                    | 360          |                  | \$2,808,000  |                    |
|                        | 843+40 Long Span Structure   |              |                  |              |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF 360   | \$7,800          | \$2,808,000  | CONSTR 25.0%       |
| 110                    | 868+18 Right of Way - Dense Urban Corridor                             | 2,753        |                  | \$15,188,301 |                    |
|                        | 895+71 Right of Way Acquisition (Dense Urban)                          |              |                  |              |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | URU LF 2,753 | \$1,650          | \$4,542,450  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | RDW LF 2,753 | \$1,485          | \$4,088,205  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | CMP LF 2,753 | \$342            | \$941,526    | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU LF 2,753 | \$2,040          | \$5,616,120  | LAND 25.0%         |
| 110                    | 869+35 Additional for Long Crossing                                    | 310          |                  | \$2,418,000  |                    |
|                        | 872+45 Long Span Structure   |              |                  |              |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF 310   | \$7,800          | \$2,418,000  | CONSTR 25.0%       |
| 110                    | 879+00 Additional for High Elevated Structure                          | 1,318        |                  | \$1,186,200  |                    |
|                        | 892+18 High Structure  |              |                  |              |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH LF 1,318 | \$900            | \$1,186,200  | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>   | <u>Contingency</u>   |
|------------------------|---|--------------|------------------|---|----------------------|
| <b>110</b>             | <b>895+71 Right of Way - Dense Urban Corridor</b>                       | <b>3,229</b> |                  | <b>\$17,814,393</b>   |                      |
| <b>928+00</b>          | Right of Way Acquisition (Dense Urban)                                  |              |                  |   |                      |
|                        | 40.02 Utility Relocation along Right of Way                             | URU          | LF 3,229         | \$1,650   | CONSTR 25.0%         |
|                        | 40.07 Roadway Improvements on Right of Way                              | RDW          | LF 3,229         | \$1,485   | CONSTR 25.0%         |
|                        | 40.08 Traffic Protection and Control During Construction                | CMP          | LF 3,229         | \$342   | CONSTR 25.0%         |
|                        | 60.01 Right of Way Acquisition  | LWU          | LF 3,229         | \$2,040   | LAND 25.0%           |
| <b>110</b>             | <b>917+00 Additional for Long Crossing</b>                              | <b>400</b>   |                  | <b>\$3,120,000</b>  |                      |
| <b>921+00</b>          | Long Span Structure   |              |                  |   |                      |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | GRL          | LF 400           | \$7,800   | CONSTR 25.0%         |
| <b>110</b>             | <b>928+00 Right of Way - Dense Urban Corridor</b>                       | <b>3,921</b> |                  | <b>\$21,632,157</b>   |                      |
| <b>967+21</b>          | Right of Way Acquisition (Dense Urban)                                  |              |                  |   |                      |
|                        | 40.02 Utility Relocation along Right of Way                             | URU          | LF 3,921         | \$1,650   | CONSTR 25.0%         |
|                        | 40.07 Roadway Improvements on Right of Way                              | RDW          | LF 3,921         | \$1,485   | CONSTR 25.0%         |
|                        | 40.08 Traffic Protection and Control During Construction                | CMP          | LF 3,921         | \$342   | CONSTR 25.0%         |
|                        | 60.01 Right of Way Acquisition  | LWU          | LF 3,921         | \$2,040   | LAND 25.0%           |
| <b>110</b>             | <b>966+00 Additional for Long Crossing</b>                              | <b>400</b>   |                  | <b>\$3,120,000</b>  |                      |
| <b>970+00</b>          | Long Span Structure   |              |                  |   |                      |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | GRL          | LF 400           | \$7,800   | CONSTR 25.0%         |
|                        |   |              |                  | <b>Subtotal Part 3: West Los Angeles to LA Union Station:</b> | <b>\$650,682,951</b> |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>110</b>             | <b>969+00 HSR Elevated Section (Urban Aerial) - 2 Tracks</b>           | <b>94,600</b> |                  | <b>\$571,194,800</b> |                    |
| <b>1915+00</b>         | Urban Aerial   |               |                  |                      |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                 | LF            | \$4,500          | \$425,700,000        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                | TRD           | \$305            | \$57,706,000         | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)  | YRA           | \$275            | \$26,015,000         | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System                                    | YRW           | \$22             | \$2,081,200          | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply  | PRS           | \$141            | \$13,338,600         | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                                  | PRD           | \$262            | \$24,785,200         | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                      | CR1           | \$228            | \$21,568,800         | CONSTR 25.0%       |
| <b>110</b>             | <b>998+00 Additional for Long Crossing</b>                             | <b>500</b>    |                  | <b>\$3,900,000</b>   |                    |
| <b>1003+00</b>         | Long Span Structure  |               |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL           | \$7,800          | \$3,900,000          | CONSTR 25.0%       |
| <b>110</b>             | <b>1003+56 Right of Way - Freight Corridor</b>                         | <b>13,869</b> |                  | <b>\$7,073,190</b>   |                    |
| <b>1142+25</b>         | Right of Way Acquisition (Freight)                                     |               |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | URU           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | RDW           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                                     | CFL           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | CMP           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU           | \$510            | \$7,073,190          | LAND 25.0%         |
| <b>110</b>             | <b>1019+00 Additional for Long Crossing</b>                            | <b>300</b>    |                  | <b>\$2,340,000</b>   |                    |
| <b>1022+00</b>         | Long Span Structure  |               |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL           | \$7,800          | \$2,340,000          | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>I10 1044+00</b>     | <b>Additional for Long Crossing</b>                                    | <b>200</b>   |                  | <b>\$1,560,000</b>  |                    |
| <b>1046+00</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 200          | LF               | \$7,800             | CONSTR 25.0%       |
| <b>I10 1067+00</b>     | <b>Additional for Long Crossing</b>                                    | <b>500</b>   |                  | <b>\$3,900,000</b>  |                    |
| <b>1072+00</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 500          | LF               | \$7,800             | CONSTR 25.0%       |
| <b>I10 1142+25</b>     | <b>Right of Way - Urban Corridor</b>                                   | <b>3,775</b> |                  | <b>\$12,600,950</b> |                    |
| <b>1180+00</b>         | Right of Way Acquisition   |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | 3,775        | LF               | \$1,100             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | 3,775        | LF               | \$990               | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | 3,775        | LF               | \$228               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | 3,775        | LF               | \$1,020             | LAND 25.0%         |
| <b>I10 1159+40</b>     | <b>Additional for Long Crossing</b>                                    | <b>385</b>   |                  | <b>\$3,003,000</b>  |                    |
| <b>1163+25</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 385          | LF               | \$7,800             | CONSTR 25.0%       |
| <b>I10 1167+15</b>     | <b>Additional for Long Crossing</b>                                    | <b>130</b>   |                  | <b>\$1,014,000</b>  |                    |
| <b>1168+45</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 130          | LF               | \$7,800             | CONSTR 25.0%       |
| <b>I10 1182+15</b>     | <b>Additional for Long Crossing</b>                                    | <b>240</b>   |                  | <b>\$1,872,000</b>  |                    |
| <b>1184+55</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 240          | LF               | \$7,800             | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u>    | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|---------------------------|--|------------|------------------|--------------------|--------------------|
| I10<br>1186+55<br>1193+35 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 680        |                  | <b>\$5,304,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 680        | LF               | \$7,800            | CONSTR 25.0%       |
| I10<br>1197+40<br>1198+40 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 100        |                  | <b>\$780,000</b>   |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 100        | LF               | \$7,800            | CONSTR 25.0%       |
| I10<br>1200+40<br>1203+10 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 270        |                  | <b>\$2,106,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 270        | LF               | \$7,800            | CONSTR 25.0%       |
| I10<br>1210+10<br>1213+70 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 360        |                  | <b>\$2,808,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 360        | LF               | \$7,800            | CONSTR 25.0%       |
| I10<br>1268+55<br>1270+60 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 205        |                  | <b>\$1,599,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 205        | LF               | \$7,800            | CONSTR 25.0%       |
| I10<br>1559+10<br>1562+50 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 340        |                  | <b>\$2,652,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 340        | LF               | \$7,800            | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|--------------|------------------|--------------------|--------------------|
| <b>110</b>             | <b>1561+50 Right of Way - Urban Corridor</b>                           |              |                  |                    |                    |
| <b>1578+45</b>         | Right of Way Acquisition   | <b>1,695</b> |                  | <b>\$5,657,910</b> |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | URU          | LF 1,695         | \$1,100            | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | RDW          | LF 1,695         | \$990              | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | CMP          | LF 1,695         | \$228              | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | LF 1,695         | \$1,020            | LAND 25.0%         |
| <b>110</b>             | <b>1583+05 Additional for Long Crossing</b>                            | <b>135</b>   |                  | <b>\$1,053,000</b> |                    |
| <b>1584+40</b>         | Long Span Structure  |              |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL          | LF 135           | \$7,800            | CONSTR 25.0%       |
| <b>110</b>             | <b>1601+00 Additional for Long Crossing</b>                            | <b>325</b>   |                  | <b>\$2,535,000</b> |                    |
| <b>1604+25</b>         | Long Span Structure  |              |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL          | LF 325           | \$7,800            | CONSTR 25.0%       |
| <b>110</b>             | <b>1678+10 Additional for Long Crossing</b>                            | <b>480</b>   |                  | <b>\$3,744,000</b> |                    |
| <b>1682+90</b>         | Long Span Structure  |              |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL          | LF 480           | \$7,800            | CONSTR 25.0%       |
| <b>110</b>             | <b>1692+00 Right of Way - Urban Corridor</b>                           |              |                  |                    |                    |
| <b>1708+76</b>         | Right of Way Acquisition   | <b>1,676</b> |                  | <b>\$5,594,488</b> |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | URU          | LF 1,676         | \$1,100            | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | RDW          | LF 1,676         | \$990              | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | CMP          | LF 1,676         | \$228              | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | LF 1,676         | \$1,020            | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u>    | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|---------------------------|--|------------|------------------|--------------------|--------------------|
| I10<br>1697+80<br>1705+55 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 775        |                  | <b>\$6,045,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | LF         | \$7,800          | \$6,045,000        | CONSTR 25.0%       |
| I10<br>1713+65<br>1716+90 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 325        |                  | <b>\$2,535,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | \$7,800          | \$2,535,000        | CONSTR 25.0%       |
| I10<br>1724+80<br>1728+10 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 330        |                  | <b>\$2,574,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | \$7,800          | \$2,574,000        | CONSTR 25.0%       |
| I10<br>1770+70<br>1773+80 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 310        |                  | <b>\$2,418,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | \$7,800          | \$2,418,000        | CONSTR 25.0%       |
| I10<br>1792+00<br>1795+00 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 300        |                  | <b>\$2,340,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | \$7,800          | \$2,340,000        | CONSTR 25.0%       |
| I10<br>1802+75<br>1806+40 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 365        |                  | <b>\$2,847,000</b> |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | \$7,800          | \$2,847,000        | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 2: Interstate 10 Freeway

| <u>Station From/To</u>    | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u>   |
|---------------------------|--|------------|------------------|--------------------|----------------------|
| 110<br>1808+00<br>1812+00 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 400        |                  | <b>\$3,120,000</b> |                      |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 400 LF     | \$7,800          | \$3,120,000        | CONSTR 25.0%         |
| 110<br>1830+80<br>1834+00 | <b>Additional for Long Crossing</b><br>Long Span Structure             | 320        |                  | <b>\$2,496,000</b> |                      |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 320 LF     | \$7,800          | \$2,496,000        | CONSTR 25.0%         |
| 110<br>1892+00<br>1915+00 | <b>Right of Way - Urban Corridor</b><br>Right of Way Acquisition       | 2,300      |                  | <b>\$7,677,400</b> |                      |
|                           | 40.02 Utility Relocation along Right of Way                            | URU LF     | \$1,100          | \$2,530,000        | CONSTR 25.0%         |
|                           | 40.07 Roadway Improvements on Right of Way                             | RDW LF     | \$990            | \$2,277,000        | CONSTR 25.0%         |
|                           | 40.08 Traffic Protection and Control During Construction               | CMP LF     | \$228            | \$524,400          | CONSTR 25.0%         |
|                           | 60.01 Right of Way Acquisition   | LWU LF     | \$1,020          | \$2,346,000        | LAND 25.0%           |
|                           | <b>Subtotal Part 2: Interstate 10 Freeway:</b>                         |            |                  |                    | <b>\$674,343,738</b> |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>     | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|---|----------------|------------------|----------------------|--------------------|
| <b>I10</b>             | <b>1915+00 HSR Elevated Section (Urban Aerial) - 2 Tracks</b>               | <b>106,600</b> |                  | <b>\$643,650,800</b> |                    |
| <b>2981+00</b>         | Urban Aerial  |                |                  |                      |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                      | LF 106,600     | \$4,500          | \$479,700,000        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                     | TF 213,200     | \$305            | \$65,026,000         | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)   | LF 106,600     | \$275            | \$29,315,000         | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System   | LF 106,600     | \$22             | \$2,345,200          | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply   | LF 106,600     | \$141            | \$15,030,600         | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                                       | LF 106,600     | \$262            | \$27,929,200         | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                           | LF 106,600     | \$228            | \$24,304,800         | CONSTR 25.0%       |
| <b>I10</b>             | <b>1944+00 Right of Way - Urban Corridor</b>                                | <b>1,961</b>   |                  | <b>\$6,545,818</b>   |                    |
| <b>1963+61</b>         | Right of Way Acquisition  |                |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                                 | LF 1,961       | \$1,100          | \$2,157,100          | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                  | LF 1,961       | \$990            | \$1,941,390          | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                    | LF 1,961       | \$228            | \$447,108            | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | LF 1,961       | \$1,020          | \$2,000,220          | LAND 25.0%         |
| <b>I10</b>             | <b>2062+70 Additional for High Elevated Structure</b>                       | <b>1,364</b>   |                  | <b>\$1,227,600</b>   |                    |
| <b>2076+34</b>         | High Structure  |                |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for High Structure          | LF 1,364       | \$900            | \$1,227,600          | CONSTR 25.0%       |
| <b>I10</b>             | <b>2076+00 Additional for Long Crossing</b>                                 | <b>34</b>      |                  | <b>\$265,200</b>     |                    |
| <b>2076+34</b>         | Long Span Structure   |                |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure     | LF 34          | \$7,800          | \$265,200            | CONSTR 25.0%       |
| <b>I10</b>             | <b>2076+34 Additional for Super High (&gt;60') Elevated Structure</b>       | <b>290</b>     |                  | <b>\$783,000</b>     |                    |
| <b>2079+24</b>         | High Structure  |                |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for High Structure over 60' | LF 290         | \$2,700          | \$783,000            | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u>    | <u>Cost Item</u>  | <u>Qty</u>                           | <u>Unit Cost</u>                     | <u>Cost</u>  | <u>Contingency</u>   |
|---------------------------|---|--------------------------------------|--------------------------------------|--|--|
| I10<br>2087+36<br>2103+00 | Additional for High Elevated Structure<br>High Structure  | 1,564                                |                                      | \$1,407,600  |  |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure   | GRH LF                               | \$900                                | \$1,407,600  | CONSTR 25.0%   |
| I10<br>2103+00<br>2104+00 | Additional for Super High (>60') Elevated Structure<br>High Structure   | 100                                  |                                      | \$270,000  |  |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'  | GRS LF                               | \$2,700                              | \$270,000  | CONSTR 25.0%   |
| I10<br>2104+00<br>2117+59 | Additional for High Elevated Structure<br>High Structure  | 1,359                                |                                      | \$1,223,100  |  |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure   | GRH LF                               | \$900                                | \$1,223,100  | CONSTR 25.0%   |
| I10<br>2117+59<br>2163+50 | Additional for Super High (>60') Elevated Structure<br>High Structure   | 4,591                                |                                      | \$12,395,700                                       |  |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60'  | GRS LF                               | \$2,700                              | \$12,395,700                                       | CONSTR 25.0%   |
| I10<br>2125+65<br>2129+00 | Additional for Long Crossing<br>Long Span Structure   | 335                                  |                                      | \$2,613,000  |  |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure  | GRL LF                               | \$7,800                              | \$2,613,000  | CONSTR 25.0%   |
| I10<br>2159+50<br>2168+71 | Right of Way - Urban Corridor<br>Right of Way Acquisition   | 921                                  |                                      | \$3,074,298  |  |
|                           | 40.02 Utility Relocation along Right of Way<br>40.07 Roadway Improvements on Right of Way<br>40.08 Traffic Protection and Control During Construction<br>60.01 Right of Way Acquisition | URU LF<br>RDW LF<br>CMP LF<br>LWU LF | \$1,100<br>\$990<br>\$228<br>\$1,020 | \$1,013,100<br>\$911,790<br>\$209,988<br>\$939,420 | CONSTR 25.0%<br>CONSTR 25.0%<br>CONSTR 25.0%<br>LAND 25.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u>    | <u>Cost Item</u>  | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|---------------------------|---|------------|------------------|-------------|--------------------|
| I10<br>2163+50<br>2173+11 | Additional for High Elevated Structure<br>High Structure          | 961        |                  | \$864,900   |                    |
|                           | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure | GRH LF 961 | \$900            | \$864,900   | CONSTR 25.0%       |
| I10<br>2180+00<br>2185+00 | Right of Way - Urban Corridor<br>Right of Way Acquisition         | 500        |                  | \$1,669,000 |                    |
|                           | 40.02 Utility Relocation along Right of Way                       | URU LF 500 | \$1,100          | \$550,000   | CONSTR 25.0%       |
|                           | 40.07 Roadway Improvements on Right of Way                        | RDW LF 500 | \$990            | \$495,000   | CONSTR 25.0%       |
|                           | 40.08 Traffic Protection and Control During Construction          | CMP LF 500 | \$228            | \$114,000   | CONSTR 25.0%       |
|                           | 60.01 Right of Way Acquisition                                    | LWU LF 500 | \$1,020          | \$510,000   | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>I10</b>             | <b>2182+64 HSR Elevated Section (Urban Aerial) - 2 Tracks</b>              | <b>-1,536</b> |                  | <b>(\$9,274,368)</b> |                    |
| <b>2198+00</b>         | Two-Track Elevated Guideway - Offset                                       |               |                  |                      |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                     | LF            | \$4,500          | (\$6,912,000)        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                    | TRD           | \$305            | (\$936,960)          | LOW 10.0%          |
|                        | 50.01 HSR Wayside Protection System  | YRW           | \$22             | (\$33,792)           | CONSTR 25.0%       |
|                        | 50.01 HSR Signaling (ATC)  | YRA           | \$275            | (\$422,400)          | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply  | PRS           | \$141            | (\$216,576)          | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                                      | PRD           | \$262            | (\$402,432)          | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                          | CR1           | \$228            | (\$350,208)          | CONSTR 25.0%       |
| <b>I10</b>             | <b>2182+64 HSR Retained Cut Section</b>                                    | <b>1,536</b>  |                  | <b>\$12,192,768</b>  |                    |
| <b>2198+00</b>         | Retained Cut Section   |               |                  |                      |                    |
|                        | 10.08 Retained HSR Section (Trench)  | GR6           | \$6,400          | \$9,830,400          | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                    | TRD           | \$305            | \$936,960            | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)  | YRA           | \$275            | \$422,400            | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System  | YRW           | \$22             | \$33,792             | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply  | PRS           | \$141            | \$216,576            | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                                      | PRD           | \$262            | \$402,432            | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                          | CR1           | \$228            | \$350,208            | CONSTR 25.0%       |
| <b>I10</b>             | <b>2209+50 Additional for Super High (&gt;60') Elevated Structure</b>      | <b>450</b>    |                  | <b>\$1,215,000</b>   |                    |
| <b>2214+00</b>         | High Structure   |               |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60' | GRS           | \$2,700          | \$1,215,000          | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>110 2212+00</b>     | <b>Right of Way - Urban Corridor</b>                                       | <b>800</b> |                  | <b>\$2,670,400</b> |                    |
| <b>2220+00</b>         | Right of Way Acquisition   |            |                  |                    |                    |
|                        | 40.02 Utility Relocation along Right of Way                                | URU        | LF               | \$1,100            | CONSTR             |
|                        | 40.07 Roadway Improvements on Right of Way                                 | RDW        | LF               | \$990              | CONSTR             |
|                        | 40.08 Traffic Protection and Control During Construction                   | CMP        | LF               | \$228              | CONSTR             |
|                        | 60.01 Right of Way Acquisition   | LWU        | LF               | \$1,020            | LAND               |
|                        |  |            |                  | \$880,000          | 25.0%              |
|                        |  |            |                  | \$792,000          | 25.0%              |
|                        |  |            |                  | \$182,400          | 25.0%              |
|                        |  |            |                  | \$816,000          | 25.0%              |
| <b>110 2220+36</b>     | <b>Additional for Super High (&gt;60') Elevated Structure</b>              | <b>164</b> |                  | <b>\$442,800</b>   |                    |
| <b>2222+00</b>         | High Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60' | GRS        | LF               | \$2,700            | CONSTR             |
|                        |  |            |                  | \$442,800          | 25.0%              |
| <b>110 2222+00</b>     | <b>Additional for High Elevated Structure</b>                              | <b>900</b> |                  | <b>\$810,000</b>   |                    |
| <b>2231+00</b>         | High Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure          | GRH        | LF               | \$900              | CONSTR             |
|                        |  |            |                  | \$810,000          | 25.0%              |
| <b>110 2224+00</b>     | <b>Additional for High Elevated Structure</b>                              | <b>700</b> |                  | <b>\$630,000</b>   |                    |
| <b>2231+00</b>         | High Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure          | GRH        | LF               | \$900              | CONSTR             |
|                        |  |            |                  | \$630,000          | 25.0%              |
| <b>110 2225+00</b>     | <b>Right of Way - Urban Corridor</b>                                       | <b>100</b> |                  | <b>\$333,800</b>   |                    |
| <b>2226+00</b>         | Right of Way Acquisition   |            |                  |                    |                    |
|                        | 40.02 Utility Relocation along Right of Way                                | URU        | LF               | \$1,100            | CONSTR             |
|                        | 40.07 Roadway Improvements on Right of Way                                 | RDW        | LF               | \$990              | CONSTR             |
|                        | 40.08 Traffic Protection and Control During Construction                   | CMP        | LF               | \$228              | CONSTR             |
|                        | 60.01 Right of Way Acquisition   | LWU        | LF               | \$1,020            | LAND               |
|                        |  |            |                  | \$110,000          | 25.0%              |
|                        |  |            |                  | \$99,000           | 25.0%              |
|                        |  |            |                  | \$22,800           | 25.0%              |
|                        |  |            |                  | \$102,000          | 25.0%              |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>I10 2231+00</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b>                |              |                  |                     |                    |
| <b>2250+00</b>         | Two-Track Elevated Guideway - Offset                                 | -1,900       |                  | (\$11,472,200)      |                    |
| 10.04                  | Elevated HSR Guideway (2 Tracks)                                     | LF           | \$4,500          | (\$8,550,000)       | CONSTR 25.0%       |
| 10.09                  | HSR Track on Structure (2 Tracks)                                    | TF           | \$305            | (\$1,159,000)       | LOW 10.0%          |
| 50.01                  | HSR Signaling (ATC)  | LF           | \$275            | (\$522,500)         | CONSTR 25.0%       |
| 50.01                  | HSR Wayside Protection System  | LF           | \$22             | (\$41,800)          | CONSTR 25.0%       |
| 50.03                  | HSR Traction Power Supply  | LF           | \$141            | (\$267,900)         | CONSTR 25.0%       |
| 50.04                  | HSR Traction Power Distribution                                      | LF           | \$262            | (\$497,800)         | CONSTR 25.0%       |
| 50.05                  | HSR Communications (w/Fiber Optic Backbone)                          | LF           | \$228            | (\$433,200)         | CONSTR 25.0%       |
| <b>I10 2231+00</b>     | <b>HSR Retained Cut Section</b>                                      | <b>1,900</b> |                  | <b>\$15,082,200</b> |                    |
| <b>2250+00</b>         | Retained Cut Section - Extended                                      |              |                  |                     |                    |
| 10.08                  | Retained HSR Section (Trench)  | LF           | \$6,400          | \$12,160,000        | CONSTR 25.0%       |
| 10.09                  | HSR Track on Structure (2 Tracks)                                    | TF           | \$305            | \$1,159,000         | LOW 10.0%          |
| 50.01                  | HSR Wayside Protection System  | LF           | \$22             | \$41,800            | CONSTR 25.0%       |
| 50.01                  | HSR Signaling (ATC)  | LF           | \$275            | \$522,500           | CONSTR 25.0%       |
| 50.03                  | HSR Traction Power Supply  | LF           | \$141            | \$267,900           | CONSTR 25.0%       |
| 50.04                  | HSR Traction Power Distribution                                      | LF           | \$262            | \$497,800           | CONSTR 25.0%       |
| 50.05                  | HSR Communications (w/Fiber Optic Backbone)                          | LF           | \$228            | \$433,200           | CONSTR 25.0%       |
| <b>I10 2255+00</b>     | <b>Additional for Super High (&gt;60') Elevated Structure</b>        | <b>1,100</b> |                  | <b>\$2,970,000</b>  |                    |
| <b>2266+00</b>         | High Structure   |              |                  |                     |                    |
| 10.04                  | Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60' | LF           | \$2,700          | \$2,970,000         | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>I10 2265+00</b>     | <b>Right of Way - Urban Corridor</b>                                       |              |                  |                     |                    |
| <b>2298+00</b>         | Right of Way Acquisition   | <b>3,300</b> |                  | <b>\$11,015,400</b> |                    |
|                        | 40.02 Utility Relocation along Right of Way                                | URU          | LF 3,300         | \$1,100             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                 | RDW          | LF 3,300         | \$990               | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                   | CMP          | LF 3,300         | \$228               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | LF 3,300         | \$1,020             | LAND 25.0%         |
| <b>I10 2266+00</b>     | <b>Additional for High Elevated Structure</b>                              | <b>800</b>   |                  | <b>\$720,000</b>    |                    |
| <b>2274+00</b>         | High Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure          | GRH          | LF 800           | \$900               | CONSTR 25.0%       |
| <b>I10 2274+00</b>     | <b>Additional for Super High (&gt;60') Elevated Structure</b>              | <b>3,750</b> |                  | <b>\$10,125,000</b> |                    |
| <b>2311+50</b>         | High Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60' | GRS          | LF 3,750         | \$2,700             | CONSTR 25.0%       |
| <b>I10 2300+66</b>     | <b>Additional for High Elevated Structure</b>                              | <b>150</b>   |                  | <b>\$135,000</b>    |                    |
| <b>2313+00</b>         | High Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure          | GRH          | LF 150           | \$900               | CONSTR 25.0%       |
| <b>I10 2309+15</b>     | <b>Additional for Long Crossing</b>  | <b>610</b>   |                  | <b>\$4,758,000</b>  |                    |
| <b>2315+25</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure     | GRL          | LF 610           | \$7,800             | CONSTR 25.0%       |
| <b>I10 2313+00</b>     | <b>Additional for Super High (&gt;60') Elevated Structure</b>              | <b>1,900</b> |                  | <b>\$5,130,000</b>  |                    |
| <b>2332+00</b>         | High Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure over 60' | GRS          | LF 1,900         | \$2,700             | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|---------------|------------------|---------------------|--------------------|
| <b>I10 2332+00</b>     | <b>Additional for High Elevated Structure</b>                          | <b>800</b>    |                  | <b>\$720,000</b>    |                    |
| <b>2340+00</b>         | High Structure   |               |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | 800           | LF               | \$900               | CONSTR 25.0%       |
| <b>I10 2337+55</b>     | <b>Additional for Long Crossing</b>                                    | <b>675</b>    |                  | <b>\$5,265,000</b>  |                    |
| <b>2344+30</b>         | Long Span Structure  |               |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 675           | LF               | \$7,800             | CONSTR 25.0%       |
| <b>I10 2381+76</b>     | <b>Right of Way - Urban Corridor</b>                                   | <b>324</b>    |                  | <b>\$1,081,512</b>  |                    |
| <b>2385+00</b>         | Right of Way Acquisition   |               |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | 324           | LF               | \$1,100             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | 324           | LF               | \$990               | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | 324           | LF               | \$228               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | 324           | LF               | \$1,020             | LAND 25.0%         |
| <b>I10 2385+00</b>     | <b>Right of Way - Freight Corridor</b>                                 | <b>43,500</b> |                  | <b>\$22,185,000</b> |                    |
| <b>2820+00</b>         | Right of Way Acquisition (Freight)                                     |               |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | 0             | LF               | \$0                 | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | 0             | LF               | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | 0             | LF               | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                                     | 43,500        | LF               | \$0                 | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | 43,500        | LF               | \$510               | LAND 25.0%         |
| <b>I10 2540+00</b>     | <b>Additional for Long Crossing</b>                                    | <b>400</b>    |                  | <b>\$3,120,000</b>  |                    |
| <b>2544+00</b>         | Long Span Structure  |               |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 400           | LF               | \$7,800             | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>I10 2857+19</b>     | <b>Additional for Long Crossing</b>                                    | <b>326</b>   |                  | <b>\$2,542,800</b>  |                    |
| <b>2860+45</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF 326   | \$7,800          | \$2,542,800         | CONSTR 25.0%       |
| <b>I10 2864+00</b>     | <b>Right of Way - Urban Corridor</b>                                   | <b>8,351</b> |                  | <b>\$27,875,638</b> |                    |
| <b>2947+51</b>         | Right of Way Acquisition (Airport Property)                            |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | URU LF 8,351 | \$1,100          | \$9,186,100         | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | RDW LF 8,351 | \$990            | \$8,267,490         | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | CMP LF 8,351 | \$228            | \$1,904,028         | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU LF 8,351 | \$1,020          | \$8,518,020         | LAND 25.0%         |
| <b>I10 2892+03</b>     | <b>Additional for Long Crossing</b>                                    | <b>315</b>   |                  | <b>\$2,457,000</b>  |                    |
| <b>2895+18</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF 315   | \$7,800          | \$2,457,000         | CONSTR 25.0%       |
| <b>I10 2937+58</b>     | <b>Additional for Long Crossing</b>                                    | <b>312</b>   |                  | <b>\$2,433,600</b>  |                    |
| <b>2940+70</b>         | Long Span Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL LF 312   | \$7,800          | \$2,433,600         | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Part 1: I10 to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |        |       |
|------------------------|--|--------------|------------------|---------------------|--------------------|--------|-------|
| <b>I10 2947+51</b>     | <b>Right of Way - Urban Corridor</b>                     | <b>0</b>     |                  | <b>\$0</b>          |                    |        |       |
| <b>2956+11</b>         | Right of Way Acquisition (Airport Property)              |              |                  |                     |                    |        |       |
|                        | 40.02 Utility Relocation along Right of Way              | URU          | LF               | 0                   | \$0                | CONSTR | 25.0% |
|                        | 40.07 Roadway Improvements on Right of Way               | RDW          | LF               | 0                   | \$0                | CONSTR | 25.0% |
|                        | 40.08 Traffic Protection and Control During Construction | CMP          | LF               | 0                   | \$0                | CONSTR | 25.0% |
|                        | 60.01 Right of Way Acquisition                           | LWU          | LF               | 0                   | \$0                | LAND   | 25.0% |
| <b>I10 2947+51</b>     | <b>Right of Way - Urban Corridor</b>                     | <b>3,349</b> |                  | <b>\$11,178,962</b> |                    |        |       |
| <b>2981+00</b>         | Right of Way Acquisition (Airport Property)              |              |                  |                     |                    |        |       |
|                        | 40.02 Utility Relocation along Right of Way              | URU          | LF               | 3,349               | \$1,100            | CONSTR | 25.0% |
|                        | 40.07 Roadway Improvements on Right of Way               | RDW          | LF               | 3,349               | \$990              | CONSTR | 25.0% |
|                        | 40.08 Traffic Protection and Control During Construction | CMP          | LF               | 3,349               | \$228              | CONSTR | 25.0% |
|                        | 60.01 Right of Way Acquisition                           | LWU          | LF               | 3,349               | \$1,020            | LAND   | 25.0% |

Subtotal Part 1: I10 to Ontario Airport: **\$802,333,328**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Ontario Airport Station

| <u>Station From/To</u>                   | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|--|---|--------------|------------------|----------------------|--------------------|
| <b>110 2947+51 2956+11</b>               | <b>Elevated Station (Center-Side Platform)</b><br>Ontario Airport Station | <b>1</b>     |                  | <b>\$94,138,000</b>  |                    |
| 20.02                                    | Elevated Station - Center-Side Platform with Mezzanine                    | EA           | \$85,800,000     | \$85,800,000         | CONSTR 25.0%       |
| 60.01                                    | Land Acquisition for Yards and Stations                                   | SF           | \$20             | \$6,458,000          | LAND 25.0%         |
| 60.01                                    | Land Acquisition for Yards and Stations                                   | SF           | \$20             | \$1,880,000          | LAND 25.0%         |
| <b>110 2947+51 2956+11</b>               | <b>Parking Deck Spaces</b><br>Parking at Ontario Airport                  | <b>2,000</b> |                  | <b>\$44,710,000</b>  |                    |
| 20.06                                    | Parking Space - Deck  | PKD          | \$20,475         | \$40,950,000         | CONSTR 25.0%       |
| 60.01                                    | Land Acquisition for Yards and Stations                                   | LSU          | \$20             | \$3,760,000          | LAND 25.0%         |
| <b>Subtotal Ontario Airport Station:</b> |   |              |                  | <b>\$138,848,000</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Stations - Maglev Alignment

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>I10 107+06</b>      | <b>Elevated Station (Center Platform)</b>                    | <b>1</b>     |                  | <b>\$53,386,000</b> |                    |
| <b>113+86</b>          | West Los Angeles Station                                     |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center Platform                     | EA           | \$47,200,000     | \$47,200,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$4,306,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>I10 107+06</b>      | <b>Parking Deck Spaces</b>                                   | <b>1,000</b> |                  | <b>\$22,355,000</b> |                    |
| <b>113+86</b>          | Parking at West Los Angeles Station                          |              |                  |                     |                    |
|                        | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$20,475,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>I10 1926+56</b>     | <b>Elevated Station (Center Platform)</b>                    | <b>1</b>     |                  | <b>\$53,386,000</b> |                    |
| <b>1933+36</b>         | West Covina Station  |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center Platform                     | EA           | \$47,200,000     | \$47,200,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$4,306,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>I10 1926+56</b>     | <b>Parking Deck Spaces</b>                                   | <b>2,000</b> |                  | <b>\$44,710,000</b> |                    |
| <b>1933+36</b>         | Parking at West Covina Station                               |              |                  |                     |                    |
|                        | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$40,950,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$3,760,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>UP1B 21+00</b>      | <b>Elevated Station (Center-Side Platform)</b>               | <b>1</b>     |                  | <b>\$94,138,000</b> |                    |
| <b>21+00</b>           | LA Union Station   |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center-Side Platform with Mezzanine | EA           | \$85,800,000     | \$85,800,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$6,458,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Stations - Maglev Alignment

| <u>Station From/To</u> | <u>Cost Item</u> | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|------------------------|------------------|------------|------------------|-------------|--------------------|
|------------------------|------------------|------------|------------------|-------------|--------------------|

Subtotal Stations - Maglev Alignment: \$267,975,000

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on I-10 Alignment

### Ontario Maintenance Facility

| <u>Station From/To</u>                        | <u>Cost Item</u>                    | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|---|-------------------------------------|------------|------------------|----------------------|--------------------|
| <b>HSR - Central Maintenance Facility</b>     |                                     |            |                  |                      |                    |
| Central Maintenance Facility - HSR            |                                     |            |                  |                      |                    |
| 30.02   | HSR S&I Shop Equipment              | 1          | \$2,300,000      | \$2,300,000          | 25.0%              |
| 30.02   | HSR Heavy Maintenance Equipment     | 1          | \$5,300,000      | \$5,300,000          | 25.0%              |
| 30.02   | HSR Car Wash Facility               | 1          | \$2,500,000      | \$2,500,000          | 25.0%              |
| 30.02   | HSR Heavy Maintenance Facility      | 306,800    | \$343            | \$105,232,400        | 25.0%              |
| 30.02   | HSR Service and Inspection Facility | 36,600     | \$343            | \$12,553,800         | 25.0%              |
| 30.02   | HSR Material Storage Facility       | 67,800     | \$179            | \$12,136,200         | 25.0%              |
| 30.05   | HSR Yard Tracks                     | 8          | \$2,100,000      | \$16,800,000         | 25.0%              |
| <b>Subtotal Ontario Maintenance Facility:</b> |                                     |            |                  | <b>\$156,822,400</b> |                    |

# *SCAG High Speed Regional Transportation Systems Alternatives Analysis Study*

## *Takeoff Details with Unit Costs*

SWT on I-10 Alignment

**Revenue Fleet**

| <u>Station From/To</u> | <u>Cost Item</u>            | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>                    | <u>Contingency</u> |
|------------------------|-----------------------------|------------|------------------|--------------------------------|--------------------|
|                        | <b>High Speed Trainsets</b> |            |                  |                                |                    |
|                        | High Speed Trainsets        | 7          |                  | \$210,000,000                  |                    |
| 70.03                  | High Speed Trainsets        |            |                  |                                | 10.0%              |
|                        |                             | VTH        | EA               | \$30,000,000                   | VEH_SWT            |
|                        |                             |            |                  |                                | 10.0%              |
|                        |                             |            |                  | <b>Subtotal Revenue Fleet:</b> |                    |
|                        |                             |            |                  | <b>\$210,000,000</b>           |                    |

**Total SWT on I-10 Alignment: \$2,901,005,417**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>            | <u>Contingency</u> |
|------------------------|--|---------------|------------------|------------------------|--------------------|
| <b>110</b>             | <b>106+50 Maglev - Elevated Section - 2 Tracks</b>                             | <b>86,250</b> |                  | <b>\$1,022,493,750</b> |                    |
| <b>969+00</b>          | Two-Track Elevated Guideway  |               |                  |                        |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                      | LF 86,250     | \$4,500          | \$388,125,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I  | TF 172,500    | \$2,100          | \$362,250,000          | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications  | LF 86,250     | \$1,052          | \$90,735,000           | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                          | LF 86,250     | \$2,103          | \$181,383,750          | CONSTR 25.0%       |
| <b>110</b>             | <b>123+80 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>330</b>    |                  | <b>\$792,000</b>       |                    |
| <b>127+10</b>          | Type 4 Structure   |               |                  |                        |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure       | LF 330        | \$4,000          | \$1,320,000            | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III  | TF 660        | \$1,300          | \$858,000              | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I  | TF -660       | \$2,100          | (\$1,386,000)          | G_MAG 10.0%        |
| <b>110</b>             | <b>153+80 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>380</b>    |                  | <b>\$912,000</b>       |                    |
| <b>157+60</b>          | Type 4 Structure   |               |                  |                        |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure       | LF 380        | \$4,000          | \$1,520,000            | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I  | TF -760       | \$2,100          | (\$1,596,000)          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III  | TF 760        | \$1,300          | \$988,000              | G_MAG 10.0%        |
| <b>110</b>             | <b>189+55 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>365</b>    |                  | <b>\$876,000</b>       |                    |
| <b>193+20</b>          | Type 4 Structure   |               |                  |                        |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure       | LF 365        | \$4,000          | \$1,460,000            | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I  | TF -730       | \$2,100          | (\$1,533,000)          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III  | TF 730        | \$1,300          | \$949,000              | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>I10</b>             | <b>235+10</b>  |            |                  |                    |                    |
| <b>238+65</b>          | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>355</b> |                  | <b>\$852,000</b>   |                    |
|                        | Type 4 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,420,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,491,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$923,000          | G_MAG 10.0%        |
| <b>I10</b>             | <b>268+40</b>  |            |                  |                    |                    |
| <b>275+20</b>          | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>680</b> |                  | <b>\$1,632,000</b> |                    |
|                        | Type 4 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$2,720,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$2,856,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,768,000        | G_MAG 10.0%        |
| <b>I10</b>             | <b>334+90</b>  |            |                  |                    |                    |
| <b>339+00</b>          | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>410</b> |                  | <b>\$984,000</b>   |                    |
|                        | Type 5 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,640,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,722,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,066,000        | G_MAG 10.0%        |
| <b>I10</b>             | <b>354+80</b>  |            |                  |                    |                    |
| <b>358+85</b>          | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>405</b> |                  | <b>\$972,000</b>   |                    |
|                        | Type 4 Structure   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,620,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,701,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,053,000        | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>                       | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |       |
|--|--|------------|------------------|--------------------|--------------------|-------|
| <b>I10</b><br><b>400+95</b><br><b>404+40</b> | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>345</b> |                  | <b>\$828,000</b>   |                    |       |
|  | Type 4 Structure   |            |                  |                    |                    |       |
|  | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,380,000        | CONSTR             | 25.0% |
|  | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,449,000)      | G_MAG              | 10.0% |
|  | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$897,000          | G_MAG              | 10.0% |
| <b>I10</b><br><b>516+50</b><br><b>519+80</b> | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>330</b> |                  | <b>\$792,000</b>   |                    |       |
|  | Type 4 Structure   |            |                  |                    |                    |       |
|  | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,320,000        | CONSTR             | 25.0% |
|  | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,386,000)      | G_MAG              | 10.0% |
|  | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$858,000          | G_MAG              | 10.0% |
| <b>I10</b><br><b>535+45</b><br><b>538+85</b> | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>340</b> |                  | <b>\$816,000</b>   |                    |       |
|  | Type 4 Structure   |            |                  |                    |                    |       |
|  | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,360,000        | CONSTR             | 25.0% |
|  | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$884,000          | G_MAG              | 10.0% |
|  | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,428,000)      | G_MAG              | 10.0% |
| <b>I10</b><br><b>713+20</b><br><b>720+00</b> | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>680</b> |                  | <b>\$1,632,000</b> |                    |       |
|  | Type 4 Structure   |            |                  |                    |                    |       |
|  | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$2,720,000        | CONSTR             | 25.0% |
|  | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,768,000        | G_MAG              | 10.0% |
|  | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$2,856,000)      | G_MAG              | 10.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>         | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |       |
|--------------------------------|--|------------|------------------|--------------------|--------------------|-------|
| <b>I10</b><br>720+00<br>724+18 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>418</b> |                  | <b>\$1,003,200</b> |                    |       |
|                                | Type 5 Structure   |            |                  |                    |                    |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,672,000        | CONSTR             | 25.0% |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,755,600)      | G_MAG              | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,086,800        | G_MAG              | 10.0% |
| <b>I10</b><br>724+18<br>729+18 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>500</b> |                  | <b>\$1,200,000</b> |                    |       |
|                                | Type 4 Structure   |            |                  |                    |                    |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$2,000,000        | CONSTR             | 25.0% |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$2,100,000)      | G_MAG              | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$1,300,000        | G_MAG              | 10.0% |
| <b>I10</b><br>756+40<br>758+75 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>235</b> |                  | <b>\$564,000</b>   |                    |       |
|                                | Type 4 Structure   |            |                  |                    |                    |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$940,000          | CONSTR             | 25.0% |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$611,000          | G_MAG              | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$987,000)        | G_MAG              | 10.0% |
| <b>I10</b><br>839+80<br>843+40 | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>  | <b>360</b> |                  | <b>\$864,000</b>   |                    |       |
|                                | Type 4 Structure   |            |                  |                    |                    |       |
|                                | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF         | \$4,000          | \$1,440,000        | CONSTR             | 25.0% |
|                                | 10.09 Guideway Beams (Track) Type III                                    | TF         | \$1,300          | \$936,000          | G_MAG              | 10.0% |
|                                | 10.09 Guideway Beams (Track) Type I                                      | TF         | \$2,100          | (\$1,512,000)      | G_MAG              | 10.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>110</b>             | <b>868+18 Right of Way - Dense Urban Corridor</b>                              | <b>2,753</b> |                  | <b>\$15,795,833</b> |                    |
| <b>895+71</b>          | Right of Way Acquisition (Dense Urban)   |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                                    | URU          | LF 2,753         | \$1,716             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                     | RDW          | LF 2,753         | \$1,544             | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                       | CMP          | LF 2,753         | \$356               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | LF 2,753         | \$2,122             | LAND 25.0%         |
| <b>110</b>             | <b>869+35 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>310</b>   |                  | <b>\$744,000</b>    |                    |
| <b>872+45</b>          | Type 4 Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure       | GMS          | LF 310           | \$4,000             | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III  | TM3          | TF 620           | \$1,300             | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I  | TM1          | TF -620          | \$2,100             | G_MAG 10.0%        |
| <b>110</b>             | <b>895+71 Right of Way - Dense Urban Corridor</b>                              | <b>3,229</b> |                  | <b>\$18,526,969</b> |                    |
| <b>928+00</b>          | Right of Way Acquisition (Dense Urban)   |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                                    | URU          | LF 3,229         | \$1,716             | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                     | RDW          | LF 3,229         | \$1,544             | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                       | CMP          | LF 3,229         | \$356               | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LWU          | LF 3,229         | \$2,122             | LAND 25.0%         |
| <b>110</b>             | <b>917+00 Maglev - Additional Superstructure for 2-Track Elevated Sections</b> | <b>400</b>   |                  | <b>\$960,000</b>    |                    |
| <b>921+00</b>          | Type 4 Structure   |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure       | GMS          | LF 400           | \$4,000             | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III  | TM3          | TF 800           | \$1,300             | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I  | TM1          | TF -800          | \$2,100             | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|---|--------------|------------------|---------------------|--------------------|
| <b>110 928+00</b>      | <b>Right of Way - Dense Urban Corridor</b>                                |              |                  |                     |                    |
| <b>967+21</b>          | Right of Way Acquisition (Dense Urban)                                    | <b>3,921</b> |                  | <b>\$22,497,443</b> |                    |
|                        | 40.02 Utility Relocation along Right of Way                               | URU LF       | \$1,716          | \$6,728,436         | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                | RDW LF       | \$1,544          | \$6,055,592         | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                  | CMP LF       | \$356            | \$1,394,621         | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | LWU LF       | \$2,122          | \$8,318,794         | LAND 25.0%         |
| <b>110 966+00</b>      | <b>Maglev - Additional Superstructure for 2-Track Elevated Sections</b>   | <b>400</b>   |                  | <b>\$960,000</b>    |                    |
| <b>970+00</b>          | Type 4 Structure  |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure | GMS LF       | \$4,000          | \$1,600,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                     | TM3 TF       | \$1,300          | \$1,040,000         | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TM1 TF       | \$2,100          | (\$1,680,000)       | G_MAG 10.0%        |

Subtotal Part 3: West Los Angeles to LA Union Station: **\$1,096,697,195**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>UP1B</b>            | <b>21+00 Maglev - Elevated Section - 2 Tracks</b>                        | <b>35,761</b> |                  | <b>\$423,946,655</b> |                    |
| <b>130+00</b>          | Urban Aerial over Freight Corridor                                       |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                | LF 35,761     | \$4,500          | \$160,924,500        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF 71,522     | \$2,100          | \$150,196,200        | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                  | LF 35,761     | \$1,052          | \$37,620,572         | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                    | LF 35,761     | \$2,103          | \$75,205,383         | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>21+00 Right of Way - Freight Corridor</b>                             | <b>35,761</b> |                  | <b>\$18,967,634</b>  |                    |
| <b>130+00</b>          | Property Acquisition (Freight)   |               |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                              | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                               | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                 | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                                       | LF 35,761     | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LF 35,761     | \$530            | \$18,967,634         | LAND 25.0%         |
| <b>UP1B</b>            | <b>33+00 Maglev Freeway Crossing</b>                                     | <b>1</b>      |                  | <b>\$4,080,000</b>   |                    |
| <b>33+00</b>           | Freeway Crossing - 101 Freeway   |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,700      | \$4,000          | \$6,800,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,400     | \$2,100          | (\$7,140,000)        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,400      | \$1,300          | \$4,420,000          | G_MAG 10.0%        |
| <b>UP1B</b>            | <b>45+00 Maglev Street Crossing</b>                                      | <b>1</b>      |                  | <b>\$3,600,000</b>   |                    |
| <b>45+00</b>           | Street Crossing - 4th Street   |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500      | \$4,000          | \$6,000,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000      | \$1,300          | \$3,900,000          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000     | \$2,100          | (\$6,300,000)        | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>UP1B 49+00</b>      | <b>Maglev Street Crossing</b>  | <b>1</b>   |                  | <b>\$3,600,000</b> |                    |
| <b>49+00</b>           | Street Crossing - 6th Street   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500   | \$4,000          | \$6,000,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000   | \$1,300          | \$3,900,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000  | \$2,100          | (\$6,300,000)      | G_MAG 10.0%        |
| <b>UP1B 54+00</b>      | <b>Maglev Street Crossing</b>  | <b>1</b>   |                  | <b>\$3,600,000</b> |                    |
| <b>54+00</b>           | Street Crossing - 7th Street   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500   | \$4,000          | \$6,000,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000   | \$1,300          | \$3,900,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000  | \$2,100          | (\$6,300,000)      | G_MAG 10.0%        |
| <b>UP1B 60+00</b>      | <b>Maglev Freeway Crossing</b>   | <b>1</b>   |                  | <b>\$4,080,000</b> |                    |
| <b>60+00</b>           | Freeway Crossing - Santa Monica Freeway                                  |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,700   | \$4,000          | \$6,800,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,400   | \$1,300          | \$4,420,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,400  | \$2,100          | (\$7,140,000)      | G_MAG 10.0%        |
| <b>UP1B 64+00</b>      | <b>Maglev Street Crossing</b>  | <b>1</b>   |                  | <b>\$3,600,000</b> |                    |
| <b>64+00</b>           | Olympic Boulevard  |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500   | \$4,000          | \$6,000,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000   | \$1,300          | \$3,900,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000  | \$2,100          | (\$6,300,000)      | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>UP1B</b><br>118+00  | <b>Maglev Freeway Crossing</b>   | <b>1</b>      |                  | <b>\$4,080,000</b>   |                    |
| 118+00                 | Long Beach Freeway   |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,700      | \$4,000          | \$6,800,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,400      | \$1,300          | \$4,420,000          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,400     | \$2,100          | (\$7,140,000)        | G_MAG 10.0%        |
| <b>UP1B</b><br>130+00  | <b>Maglev - Elevated Section - 2 Tracks</b>                              | <b>22,966</b> |                  | <b>\$272,261,930</b> |                    |
| 200+00                 | Urban Aerial over Freight Corridor                                       |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                | LF 22,966     | \$4,500          | \$103,347,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF 45,932     | \$2,100          | \$96,457,200         | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                  | LF 22,966     | \$1,052          | \$24,160,232         | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                    | LF 22,966     | \$2,103          | \$48,297,498         | CONSTR 25.0%       |
| <b>UP1B</b><br>130+00  | <b>Right of Way - Freight Corridor</b>                                   | <b>22,966</b> |                  | <b>\$12,181,166</b>  |                    |
| 200+00                 | Property Acquisition (Freight)   |               |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                              | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                               | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                                       | LF 22,966     | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                 | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LF 22,966     | \$530            | \$12,181,166         | LAND 25.0%         |
| <b>UP1B</b><br>184+50  | <b>Maglev Street Crossing</b>  | <b>1</b>      |                  | <b>\$3,600,000</b>   |                    |
| 184+50                 | Bluff Rd   |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500      | \$4,000          | \$6,000,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000      | \$1,300          | \$3,900,000          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000     | \$2,100          | (\$6,300,000)        | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u>          | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|---------------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>UP1B</b><br>200+00<br>210+00 | <b>Maglev - Elevated Section - 2 Tracks</b><br>Elevated  | <b>3,281</b>  |                  | <b>\$38,896,255</b>  |                    |
|                                 | 10.04 Elevated Maglev Guideway (2 Tracks)  | GME LF 3,281  | \$4,500          | \$14,764,500         | CONSTR 25.0%       |
|                                 | 10.09 Guideway Beams (Track) Type I  | TM1 TF 6,562  | \$2,100          | \$13,780,200         | G_MAG 10.0%        |
|                                 | 50.01 Maglev Signals and Communications  | YMM LF 3,281  | \$1,052          | \$3,451,612          | CONSTR 25.0%       |
|                                 | 50.03 Maglev Traction Power (Supply and Distribution)  | PMM LF 3,281  | \$2,103          | \$6,899,943          | CONSTR 25.0%       |
| <b>UP1B</b><br>200+00<br>210+00 | <b>Right of Way - Freight Corridor</b><br>Property Acquisition (Freight)                               | <b>3,281</b>  |                  | <b>\$1,740,242</b>   |                    |
|                                 | 40.02 Utility Relocation along Right of Way  | URU LF 0      | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 40.07 Roadway Improvements on Right of Way   | RDW LF 0      | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 40.08 Traffic Protection and Control During Construction   | CMP LF 0      | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 40.08 Flagging in Freight Corridor   | CFL LF 3,281  | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 60.01 Right of Way Acquisition   | LWU LF 3,281  | \$530            | \$1,740,242          | LAND 25.0%         |
| <b>UP1B</b><br>210+00<br>270+00 | <b>Maglev - Elevated Section - 2 Tracks</b><br>Urban At-Grade within Freight Corridor (to Be Elevated) | <b>19,685</b> |                  | <b>\$233,365,675</b> |                    |
|                                 | 10.04 Elevated Maglev Guideway (2 Tracks)  | GME LF 19,685 | \$4,500          | \$88,582,500         | CONSTR 25.0%       |
|                                 | 10.09 Guideway Beams (Track) Type I  | TM1 TF 39,370 | \$2,100          | \$82,677,000         | G_MAG 10.0%        |
|                                 | 50.01 Maglev Signals and Communications  | YMM LF 19,685 | \$1,052          | \$20,708,620         | CONSTR 25.0%       |
|                                 | 50.03 Maglev Traction Power (Supply and Distribution)  | PMM LF 19,685 | \$2,103          | \$41,397,555         | CONSTR 25.0%       |
| <b>UP1B</b><br>210+00<br>270+00 | <b>Right of Way - Freight Corridor</b><br>Property Acquisition (Freight)                               | <b>19,685</b> |                  | <b>\$10,440,924</b>  |                    |
|                                 | 40.02 Utility Relocation along Right of Way  | URU LF 0      | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 40.07 Roadway Improvements on Right of Way   | RDW LF 0      | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 40.08 Flagging in Freight Corridor   | CFL LF 19,685 | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 40.08 Traffic Protection and Control During Construction   | CMP LF 0      | \$0              | \$0                  | CONSTR 25.0%       |
|                                 | 60.01 Right of Way Acquisition   | LWU LF 19,685 | \$530            | \$10,440,924         | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|---|---------------|------------------|----------------------|--------------------|
| <b>UP1B</b>            | <b>227+00 Maglev Freeway Crossing</b>                                     | <b>1</b>      |                  | <b>\$5,100,000</b>   |                    |
| <b>227+00</b>          | San Gabriel River Freeway   |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure | LF 1,700      | \$5,000          | \$8,500,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                     | TF 3,400      | \$1,625          | \$5,525,000          | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF -3,400     | \$2,625          | (\$8,925,000)        | G_MAG 10.0%        |
| <b>UP1B</b>            | <b>270+00 Maglev - Elevated Section - 2 Tracks</b>                        | <b>45,932</b> |                  | <b>\$544,523,860</b> |                    |
| <b>410+00</b>          | Urban At-Grade within Freight Corridor (to be Elevated)                   |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                 | LF 45,932     | \$4,500          | \$206,694,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF 91,864     | \$2,100          | \$192,914,400        | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                   | LF 45,932     | \$1,052          | \$48,320,464         | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                     | LF 45,932     | \$2,103          | \$96,594,996         | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>270+00 Right of Way - Freight Corridor</b>                             | <b>45,932</b> |                  | <b>\$24,362,333</b>  |                    |
| <b>410+00</b>          | Property Acquisition (Freight)  |               |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                               | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor  | LF 45,932     | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                  | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | LF 45,932     | \$530            | \$24,362,333         | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u> | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|------------------|--|------------------|----------------------|--------------------|
| <b>UP1B</b>            | <b>410+00</b>    | <b>Maglev - Elevated Section - 2 Tracks</b>                        |                  | <b>\$455,066,030</b> |                    |
|                        | <b>527+00</b>    | Elevated in Freight Corridor                                       | <b>38,386</b>    |                      |                    |
|                        | 10.04            | Elevated Maglev Guideway (2 Tracks)                                | LF 38,386        | \$4,500              | CONSTR 25.0%       |
|                        | 10.09            | Guideway Beams (Track) Type I                                      | TF 76,772        | \$2,100              | G_MAG 10.0%        |
|                        | 50.01            | Maglev Signals and Communications                                  | LF 38,386        | \$1,052              | CONSTR 25.0%       |
|                        | 50.03            | Maglev Traction Power (Supply and Distribution)                    | LF 38,386        | \$2,103              | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>410+00</b>    | <b>Right of Way - Freight Corridor</b>                             | <b>38,386</b>    | <b>\$20,359,934</b>  |                    |
|                        | <b>527+00</b>    | Property Acquisition (Freight)                                     |                  |                      |                    |
|                        | 40.02            | Utility Relocation along Right of Way                              | LF 0             | \$0                  | CONSTR 25.0%       |
|                        | 40.07            | Roadway Improvements on Right of Way                               | LF 0             | \$0                  | CONSTR 25.0%       |
|                        | 40.08            | Flagging in Freight Corridor                                       | LF 38,386        | \$0                  | CONSTR 25.0%       |
|                        | 40.08            | Traffic Protection and Control During Construction                 | LF 0             | \$0                  | CONSTR 25.0%       |
|                        | 60.01            | Right of Way Acquisition   | LF 38,386        | \$530                | LAND 25.0%         |
| <b>UP1B</b>            | <b>464+00</b>    | <b>Maglev Street Crossing</b>                                      | <b>1</b>         | <b>\$3,600,000</b>   |                    |
|                        | <b>464+00</b>    | Grand Avenue   |                  |                      |                    |
|                        | 10.04            | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500         | \$4,000              | CONSTR 25.0%       |
|                        | 10.09            | Guideway Beams (Track) Type III                                    | TF 3,000         | \$1,300              | G_MAG 10.0%        |
|                        | 10.09            | Guideway Beams (Track) Type I                                      | TF -3,000        | \$2,100              | G_MAG 10.0%        |
| <b>UP1B</b>            | <b>504+00</b>    | <b>Maglev Freeway Crossing</b>                                     | <b>1</b>         | <b>\$5,100,000</b>   |                    |
|                        | <b>504+00</b>    | Orange Freeway   |                  |                      |                    |
|                        | 10.04            | Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,700         | \$5,000              | CONSTR 25.0%       |
|                        | 10.09            | Guideway Beams (Track) Type III                                    | TF 3,400         | \$1,625              | G_MAG 10.0%        |
|                        | 10.09            | Guideway Beams (Track) Type I                                      | TF -3,400        | \$2,625              | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u>                                 | <u>Cost Item</u>  | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>            | <u>Contingency</u> |
|--|---|------------|------------------|------------------------|--------------------|
| UP1B 523+00  | Maglev Freeway Crossing   | 1          |                  | \$5,100,000            |                    |
| 523+00   | Chino Valley Freeway  |            |                  |                        |                    |
|  | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure | LF 1,700   | \$5,000          | \$8,500,000            | CONSTR 25.0%       |
|  | 10.09 Guideway Beams (Track) Type I                                       | TF -3,400  | \$2,625          | (\$8,925,000)          | G_MAG 10.0%        |
|  | 10.09 Guideway Beams (Track) Type III                                     | TF 3,400   | \$1,625          | \$5,525,000            | G_MAG 10.0%        |
| <b>Subtotal Part B: CHSRA Union Station to Pomona:</b> |   |            |                  | <b>\$2,105,252,638</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>UP1A 220+00</b>     | <b>Maglev Street Crossing</b>  | <b>1</b>   |                  | <b>\$3,600,000</b> |                    |
| <b>220+00</b>          | Beverly Avenue   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500   | \$4,000          | \$6,000,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000   | \$1,300          | \$3,900,000        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000  | \$2,100          | (\$6,300,000)      | G_MAG 10.0%        |
|                        |  |            |                  |                    |                    |
| <b>UP1A 270+00</b>     | <b>Maglev Freeway Crossing</b>   | <b>1</b>   |                  | <b>\$4,080,000</b> |                    |
| <b>270+00</b>          | Pomona Freeway   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,700   | \$4,000          | \$6,800,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,400  | \$2,100          | (\$7,140,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,400   | \$1,300          | \$4,420,000        | G_MAG 10.0%        |
|                        |  |            |                  |                    |                    |
| <b>UP1A 328+00</b>     | <b>Maglev Street Crossing</b>  | <b>1</b>   |                  | <b>\$3,600,000</b> |                    |
| <b>328+00</b>          | Hacienda Blvd  |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500   | \$4,000          | \$6,000,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000  | \$2,100          | (\$6,300,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000   | \$1,300          | \$3,900,000        | G_MAG 10.0%        |
|                        |  |            |                  |                    |                    |
| <b>UP1A 497+00</b>     | <b>Maglev Street Crossing</b>  | <b>1</b>   |                  | <b>\$3,600,000</b> |                    |
| <b>497+00</b>          | Humane Way   |            |                  |                    |                    |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | LF 1,500   | \$4,000          | \$6,000,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TF -3,000  | \$2,100          | (\$6,300,000)      | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TF 3,000   | \$1,300          | \$3,900,000        | G_MAG 10.0%        |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|---|---------------|------------------|----------------------|--------------------|
| <b>UP1A 498+50</b>     | <b>Maglev Street Crossing</b>   | <b>1</b>      |                  | <b>\$3,600,000</b>   |                    |
| <b>498+50</b>          | W Temple Avenue   |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure | LF 1,500      | \$4,000          | \$6,000,000          | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF -3,000     | \$2,100          | (\$6,300,000)        | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                     | TF 3,000      | \$1,300          | \$3,900,000          | G_MAG 10.0%        |
| <b>UP1A 502+00</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>                               | <b>3,281</b>  |                  | <b>\$38,896,255</b>  |                    |
| <b>512+00</b>          | Elevated in Freight Corridor  |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                 | LF 3,281      | \$4,500          | \$14,764,500         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF 6,562      | \$2,100          | \$13,780,200         | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                   | LF 3,281      | \$1,052          | \$3,451,612          | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                     | LF 3,281      | \$2,103          | \$6,899,943          | CONSTR 25.0%       |
| <b>UP1A 512+00</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>                               | <b>28,871</b> |                  | <b>\$342,265,705</b> |                    |
| <b>600+00</b>          | Elevated in Freight Corridor  |               |                  |                      |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                 | LF 28,871     | \$4,500          | \$129,919,500        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF 57,742     | \$2,100          | \$121,258,200        | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                   | LF 28,871     | \$1,052          | \$30,372,292         | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                     | LF 28,871     | \$2,103          | \$60,715,713         | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |        |       |
|------------------------|--|---------------|------------------|----------------------|--------------------|--------|-------|
| <b>UP1A 538+40</b>     | <b>Right of Way - Freight Corridor</b>                                   | <b>20,210</b> |                  | <b>\$10,719,384</b>  |                    |        |       |
| <b>600+00</b>          | Property Acquisition (Freight)   |               |                  |                      |                    |        |       |
|                        | 40.02 Utility Relocation along Right of Way                              | URU           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.07 Roadway Improvements on Right of Way                               | RDW           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.08 Traffic Protection and Control During Construction                 | CMP           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.08 Flagging in Freight Corridor                                       | CFL           | LF               | 20,210               | \$0                | CONSTR | 25.0% |
|                        | 60.01 Right of Way Acquisition   | LWU           | LF               | 20,210               | \$530              | LAND   | 25.0% |
|                        |  |               |                  |                      | \$10,719,384       |        |       |
| <b>UP1A 538+40</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>                              | <b>36,614</b> |                  | <b>\$434,058,970</b> |                    |        |       |
| <b>650+00</b>          | Elevated in Freight Corridor   |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                | GME           | LF               | 36,614               | \$4,500            | CONSTR | 25.0% |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1           | TF               | 73,228               | \$2,100            | G_MAG  | 10.0% |
|                        | 50.01 Maglev Signals and Communications                                  | YMM           | LF               | 36,614               | \$1,052            | CONSTR | 25.0% |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                    | PMM           | LF               | 36,614               | \$2,103            | CONSTR | 25.0% |
| <b>UP1A 591+50</b>     | <b>Maglev Street Crossing</b>  | <b>1</b>      |                  | <b>\$3,600,000</b>   |                    |        |       |
| <b>591+50</b>          | Central Avenue Overpass  |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated Maglev Guideway - Addl for Long Span (Type 4/5) Structure | GMS           | LF               | 1,500                | \$4,000            | CONSTR | 25.0% |
|                        | 10.09 Guideway Beams (Track) Type III                                    | TM3           | TF               | 3,000                | \$1,300            | G_MAG  | 10.0% |
|                        | 10.09 Guideway Beams (Track) Type I                                      | TM1           | TF               | -3,000               | \$2,100            | G_MAG  | 10.0% |
|                        |  |               |                  |                      | \$6,000,000        |        |       |
|                        |  |               |                  |                      | \$3,900,000        |        |       |
|                        |  |               |                  |                      | (\$6,300,000)      |        |       |
| <b>UP1A 600+00</b>     | <b>Right of Way - Freight Corridor</b>                                   | <b>16,404</b> |                  | <b>\$8,700,682</b>   |                    |        |       |
| <b>650+00</b>          | Property Acquisition (Freight)   |               |                  |                      |                    |        |       |
|                        | 40.02 Utility Relocation along Right of Way                              | URU           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.07 Roadway Improvements on Right of Way                               | RDW           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.08 Flagging in Freight Corridor                                       | CFL           | LF               | 16,404               | \$0                | CONSTR | 25.0% |
|                        | 40.08 Traffic Protection and Control During Construction                 | CMP           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 60.01 Right of Way Acquisition   | LWU           | LF               | 16,404               | \$530              | LAND   | 25.0% |
|                        |  |               |                  |                      | \$8,700,682        |        |       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|---|--------------|------------------|---------------------|--------------------|
| <b>UP1A 608+00</b>     | <b>Maglev Street Crossing</b>   | <b>1</b>     |                  | <b>\$3,600,000</b>  |                    |
| <b>608+00</b>          | Mountain Avenue Overpass  |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway - Addtl for Long Span (Type 4/5) Structure | LF 1,500     | \$4,000          | \$6,000,000         | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF -3,000    | \$2,100          | (\$6,300,000)       | G_MAG 10.0%        |
|                        | 10.09 Guideway Beams (Track) Type III                                     | TF 3,000     | \$1,300          | \$3,900,000         | G_MAG 10.0%        |
| <b>UP1A 650+00</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>                               | <b>3,281</b> |                  | <b>\$38,896,255</b> |                    |
| <b>660+00</b>          | Elevated in Freight Corridor  |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                 | LF 3,281     | \$4,500          | \$14,764,500        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF 6,562     | \$2,100          | \$13,780,200        | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                   | LF 3,281     | \$1,052          | \$3,451,612         | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                     | LF 3,281     | \$2,103          | \$6,899,943         | CONSTR 25.0%       |
| <b>UP1A 650+00</b>     | <b>Right of Way - Freight Corridor</b>                                    | <b>3,281</b> |                  | <b>\$1,740,242</b>  |                    |
| <b>660+00</b>          | Property Acquisition (Freight)  |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                               | LF 0         | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                                | LF 0         | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                  | LF 0         | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor  | LF 3,281     | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | LF 3,281     | \$530            | \$1,740,242         | LAND 25.0%         |
| <b>UP1A 660+00</b>     | <b>Maglev - Elevated Section - 2 Tracks</b>                               | <b>5,938</b> |                  | <b>\$70,394,990</b> |                    |
| <b>678+10</b>          | Elevated in Freight Corridor  |              |                  |                     |                    |
|                        | 10.04 Elevated Maglev Guideway (2 Tracks)                                 | LF 5,938     | \$4,500          | \$26,721,000        | CONSTR 25.0%       |
|                        | 10.09 Guideway Beams (Track) Type I                                       | TF 11,876    | \$2,100          | \$24,939,600        | G_MAG 10.0%        |
|                        | 50.01 Maglev Signals and Communications                                   | LF 5,938     | \$1,052          | \$6,246,776         | CONSTR 25.0%       |
|                        | 50.03 Maglev Traction Power (Supply and Distribution)                     | LF 5,938     | \$2,103          | \$12,487,614        | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u> | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|------------------------|------------------|------------|------------------|-------------|--------------------|
|------------------------|------------------|------------|------------------|-------------|--------------------|

Subtotal Part A: CHSRA - Pomona to Ontario Airport: \$971,352,483

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Ontario Airport Station

| <u>Station From/To</u>                   | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|--|--|--------------|------------------|----------------------|--------------------|
| <b>110 2947+51</b>                       | <b>Elevated Station (Center-Side Platform)</b>               | <b>1</b>     |                  | <b>\$94,138,000</b>  |                    |
| <b>2956+11</b>                           | Ontario Airport Station                                      |              |                  |                      |                    |
|  | 20.02 Elevated Station - Center-Side Platform with Mezzanine | EA           | \$85,800,000     | \$85,800,000         | CONSTR 25.0%       |
|  | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000          | LAND 25.0%         |
|  | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$6,458,000          | LAND 25.0%         |
| <b>110 2947+51</b>                       | <b>Parking Deck Spaces</b>                                   | <b>2,000</b> |                  | <b>\$44,710,000</b>  |                    |
| <b>2956+11</b>                           | Parking at Ontario Airport                                   |              |                  |                      |                    |
|  | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$40,950,000         | CONSTR 25.0%       |
|  | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$3,760,000          | LAND 25.0%         |
| <b>Subtotal Ontario Airport Station:</b> |  |              |                  | <b>\$138,848,000</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Stations - CAHSRA Alignment

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>110</b>             | <b>107+06 Elevated Station (Center Platform)</b>             | <b>1</b>     |                  | <b>\$53,386,000</b> |                    |
| <b>113+86</b>          | West Los Angeles Station                                     |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center Platform                     | EA           | \$47,200,000     | \$47,200,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$4,306,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>110</b>             | <b>Parking Deck Spaces</b>                                   | <b>1,000</b> |                  | <b>\$22,355,000</b> |                    |
| <b>113+86</b>          | Parking at West Los Angeles Station                          |              |                  |                     |                    |
|                        | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$20,475,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>UP1B</b>            | <b>21+00 Elevated Station (Center-Side Platform)</b>         | <b>1</b>     |                  | <b>\$94,138,000</b> |                    |
| <b>21+00</b>           | LA Union Station   |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center-Side Platform with Mezzanine | EA           | \$85,800,000     | \$85,800,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$6,458,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>UP1B</b>            | <b>444+55 Elevated Station (Center Platform)</b>             | <b>1</b>     |                  | <b>\$53,386,000</b> |                    |
| <b>448+55</b>          | City of Industry Station                                     |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center Platform                     | EA           | \$47,200,000     | \$47,200,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$4,306,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>UP1B</b>            | <b>444+55 Parking Deck Spaces</b>                            | <b>2,000</b> |                  | <b>\$44,710,000</b> |                    |
| <b>448+55</b>          | Parking at City of Industry Station                          |              |                  |                     |                    |
|                        | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$40,950,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$3,760,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Stations - CAHSRA Alignment

| <u>Station From/To</u> | <u>Cost Item</u> | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|------------------------|------------------|------------|------------------|-------------|--------------------|
|------------------------|------------------|------------|------------------|-------------|--------------------|

Subtotal Stations - CAHSRA Alignment: \$267,975,000

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Ontario Maintenance Facility

| <u>Station From/To</u>                        | <u>Cost Item</u>                        | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|---|---|------------|------------------|----------------------|--------------------|
| <b>Maglev - Central Maintenance Facility</b>  |   |            |                  |                      |                    |
|   | Central Maintenance Facility - Maglev   | 1          |                  | \$175,200,000        |                    |
| 30.02   | Maglev Centralized Maintenance Facility | MHF        | EA 1             | \$97,700,000         | CONSTR 25.0%       |
| 30.02   | Maglev Train Wash Facility              | MWF        | EA 1             | \$7,500,000          | CONSTR 25.0%       |
| 30.02   | Maglev Vehicle Equipment                | MEH        | EA 1             | \$70,000,000         | CONSTR 25.0%       |
| <b>Subtotal Ontario Maintenance Facility:</b> |   |            |                  | <b>\$175,200,000</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### West Los Angeles Yard

| <u>Station From/To</u> | <u>Cost Item</u>                                   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>                            | <u>Contingency</u>  |
|------------------------|--|------------|------------------|--|---------------------|
|                        | <b>Maglev - Decentralized Maintenance Facility</b> |            |                  | <b>\$29,200,000</b>                    |                     |
|                        | Decentral Maintenance Facility - Maglev            | 1          |                  |  |                     |
| 30.02                  | Maglev Decentral Maintenance Facility              | MIF        | EA               | 1 \$29,200,000                         | CONSTR              |
|                        |  |            |                  | \$29,200,000                           | 25.0%               |
|                        |  |            |                  | <b>Subtotal West Los Angeles Yard:</b> | <b>\$29,200,000</b> |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

Maglev on UPRR Alignment

### Revenue Fleet

| <u>Station From/To</u>         | <u>Cost Item</u>        | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|--------------------------------|-------------------------|------------|------------------|----------------------|--------------------|
|                                | <b>Maglev Trainsets</b> | <b>7</b>   |                  | <b>\$448,875,000</b> |                    |
|                                | Maglev Trainsets        |            |                  |                      |                    |
| 70.03                          | Maglev Train Sets       | VTM        | EA               | 7 \$64,125,000       | VEH_MAG 10.0%      |
| <b>Subtotal Revenue Fleet:</b> |                         |            |                  | <b>\$448,875,000</b> |                    |

**Total Maglev on UPRR Alignment: \$5,233,400,316**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>   | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>  | <u>Contingency</u>   |        |       |
|--|---|--|------------------|--------------|----------------------|--------|-------|
| 110<br>82+50<br>106+50   | HSR - Drill Track - West Los Angeles                                    | 1  |                  | \$14,491,200 |                      |        |       |
|  | Drill track beyond WLA station  |  |                  |              |                      |        |       |
|  | 10.04 Elevated HSR Guideway (2 Tracks)                                  | GRE  | LF               | 2,400        | \$4,500              | CONSTR | 25.0% |
|  | 10.09 HSR Track on Structure (2 Tracks)                                 | TRD  | TF               | 4,800        | \$305                | LOW    | 10.0% |
|  | 50.01 HSR Signaling (ATC)   | YRA  | LF               | 2,400        | \$275                | CONSTR | 25.0% |
|  | 50.01 HSR Wayside Protection System                                     | YRW  | LF               | 2,400        | \$22                 | CONSTR | 25.0% |
|  | 50.03 HSR Traction Power Supply   | PRS  | LF               | 2,400        | \$141                | CONSTR | 25.0% |
|  | 50.04 HSR Traction Power Distribution                                   | PRD  | LF               | 2,400        | \$262                | CONSTR | 25.0% |
|  | 50.05 HSR Communications (w/Fiber Optic Backbone)                       | CR1  | LF               | 2,400        | \$228                | CONSTR | 25.0% |
|  | <b>110 106+50 969+00</b>  | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b><br>Urban Aerial Adjacent to Highway Corridor | <b>86,250</b>    |              | <b>\$520,777,500</b> |        |       |
| 110<br>123+80<br>127+10  | 10.04 Elevated HSR Guideway (2 Tracks)                                  | GRE  | LF               | 86,250       | \$4,500              | CONSTR | 25.0% |
|  | 10.09 HSR Track on Structure (2 Tracks)                                 | TRD  | TF               | 172,500      | \$305                | LOW    | 10.0% |
|  | 50.01 HSR Signaling (ATC)   | YRA  | LF               | 86,250       | \$275                | CONSTR | 25.0% |
|  | 50.01 HSR Wayside Protection System                                     | YRW  | LF               | 86,250       | \$22                 | CONSTR | 25.0% |
|  | 50.03 HSR Traction Power Supply   | PRS  | LF               | 86,250       | \$141                | CONSTR | 25.0% |
|  | 50.04 HSR Traction Power Distribution                                   | PRD  | LF               | 86,250       | \$262                | CONSTR | 25.0% |
|  | 50.05 HSR Communications (w/Fiber Optic Backbone)                       | CR1  | LF               | 86,250       | \$228                | CONSTR | 25.0% |
|  | <b>110 123+80 127+10</b>  | <b>Additional for Long Crossing</b><br>Long Span Structure   | <b>330</b>       |              | <b>\$2,574,000</b>   |        |       |
|  | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | GRL  | LF               | 330          | \$7,800              | CONSTR | 25.0% |
|  | <b>110 148+08 163+00</b>  | <b>Additional for High Elevated Structure</b><br>High Structure                                    | <b>1,492</b>     |              | <b>\$1,342,800</b>   |        |       |
| 10.04 Elevated HSR Structure (2 Tracks) - Addtl for High Structure | GRH   | LF   | 1,492            | \$900        | CONSTR               | 25.0%  |       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>  | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|-------------------------|--|------------|------------------|-------------|--------------------|
| I10<br>153+80<br>157+60 | Additional for Long Crossing   | 380        |                  | \$2,964,000 |                    |
|                         | Long Span Structure  |            |                  |             |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 380        | LF \$7,800       | \$2,964,000 | CONSTR 25.0%       |
| I10<br>189+55<br>193+20 | Additional for Long Crossing   | 365        |                  | \$2,847,000 |                    |
|                         | Long Span Structure  |            |                  |             |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 365        | LF \$7,800       | \$2,847,000 | CONSTR 25.0%       |
| I10<br>235+10<br>238+65 | Additional for Long Crossing   | 355        |                  | \$2,769,000 |                    |
|                         | Long Span Structure  |            |                  |             |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 355        | LF \$7,800       | \$2,769,000 | CONSTR 25.0%       |
| I10<br>268+40<br>275+20 | Additional for Long Crossing   | 680        |                  | \$5,304,000 |                    |
|                         | Long Span Structure  |            |                  |             |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 680        | LF \$7,800       | \$5,304,000 | CONSTR 25.0%       |
| I10<br>334+90<br>339+00 | Additional for Long Crossing   | 410        |                  | \$3,198,000 |                    |
|                         | Long Span Structure  |            |                  |             |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 410        | LF \$7,800       | \$3,198,000 | CONSTR 25.0%       |
| I10<br>354+80<br>358+85 | Additional for Long Crossing   | 405        |                  | \$3,159,000 |                    |
|                         | Long Span Structure  |            |                  |             |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 405        | LF \$7,800       | \$3,159,000 | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>  | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|-------------------------|--|------------|------------------|-------------|--------------------|
| 110<br>400+95<br>404+40 | Additional for Long Crossing<br>Long Span Structure                    | 345        |                  | \$2,691,000 |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | LF 345     | \$7,800          | \$2,691,000 | CONSTR 25.0%       |
| 110<br>516+50<br>519+80 | Additional for Long Crossing<br>Long Span Structure                    | 330        |                  | \$2,574,000 |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL 330    | \$7,800          | \$2,574,000 | CONSTR 25.0%       |
| 110<br>535+45<br>538+85 | Additional for Long Crossing<br>Long Span Structure                    | 340        |                  | \$2,652,000 |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL 340    | \$7,800          | \$2,652,000 | CONSTR 25.0%       |
| 110<br>713+20<br>720+00 | Additional for Long Crossing<br>Long Span Structure                    | 680        |                  | \$5,304,000 |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL 680    | \$7,800          | \$5,304,000 | CONSTR 25.0%       |
| 110<br>720+00<br>724+18 | Additional for Long Crossing<br>Long Span Structure                    | 418        |                  | \$3,260,400 |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL 418    | \$7,800          | \$3,260,400 | CONSTR 25.0%       |
| 110<br>722+50<br>742+00 | Additional for High Elevated Structure<br>High Structure               | 1,950      |                  | \$1,755,000 |                    |
|                         | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH 1,950  | \$900            | \$1,755,000 | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>  | <u>Cost Item</u>   | <u>Qty</u>                                    | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |              |
|---|--|---|------------------|---------------------|--------------------|--------------|
| 110<br>724+18<br>729+18   | <b>Additional for Long Crossing</b>                                    | <b>500</b>                                    |                  | <b>\$3,900,000</b>  |                    |              |
|   | Long Span Structure  |   |                  |                     |                    |              |
|   | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 500   | LF               | \$7,800             | \$3,900,000        | CONSTR 25.0% |
| 110<br>756+40<br>758+75   | <b>Additional for Long Crossing</b>                                    | <b>235</b>                                    |                  | <b>\$1,833,000</b>  |                    |              |
|   | Long Span Structure  |   |                  |                     |                    |              |
|   | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 235   | LF               | \$7,800             | \$1,833,000        | CONSTR 25.0% |
| 110<br>839+80<br>843+40   | <b>Additional for Long Crossing</b>                                    | <b>360</b>                                    |                  | <b>\$2,808,000</b>  |                    |              |
|   | Long Span Structure  |   |                  |                     |                    |              |
|   | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 360   | LF               | \$7,800             | \$2,808,000        | CONSTR 25.0% |
| 110<br>868+18<br>895+71   | <b>Right of Way - Dense Urban Corridor</b>                             | <b>2,753</b>                                  |                  | <b>\$15,188,301</b> |                    |              |
|   | Right of Way Acquisition (Dense Urban)                                 |   |                  |                     |                    |              |
|   | 40.02 Utility Relocation along Right of Way                            | 2,753   | LF               | \$1,650             | \$4,542,450        | CONSTR 25.0% |
|   | 40.07 Roadway Improvements on Right of Way                             | 2,753   | LF               | \$1,485             | \$4,088,205        | CONSTR 25.0% |
|   | 40.08 Traffic Protection and Control During Construction               | 2,753   | LF               | \$342               | \$941,526          | CONSTR 25.0% |
|   | 60.01 Right of Way Acquisition   | 2,753   | LF               | \$2,040             | \$5,616,120        | LAND 25.0%   |
|   | <b>Additional for Long Crossing</b>                                    | <b>310</b>                                    |                  |                     | <b>\$2,418,000</b> |              |
|   | Long Span Structure  |   |                  |                     |                    |              |
|   | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | 310   | LF               | \$7,800             | \$2,418,000        | CONSTR 25.0% |
|   | 110<br>879+00<br>892+18  | <b>Additional for High Elevated Structure</b> | <b>1,318</b>     |                     | <b>\$1,186,200</b> |              |
| High Structure  |  |   |                  |                     |                    |              |
| 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure |  | 1,318   | LF               | \$900               | \$1,186,200        | CONSTR 25.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part 3: West Los Angeles to LA Union Station

| <u>Station From/To</u>  | <u>Cost Item</u>  | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|---|---|--------------|------------------|----------------------|--------------------|
| <b>I10</b>  | <b>895+71 Right of Way - Dense Urban Corridor</b>                       | <b>3,229</b> |                  | <b>\$17,814,393</b>  |                    |
| <b>928+00</b>   | Right of Way Acquisition (Dense Urban)                                  |              |                  |                      |                    |
|   | 40.02 Utility Relocation along Right of Way                             | URU          | LF 3,229         | \$1,650              | CONSTR 25.0%       |
|   | 40.07 Roadway Improvements on Right of Way                              | RDW          | LF 3,229         | \$1,485              | CONSTR 25.0%       |
|   | 40.08 Traffic Protection and Control During Construction                | CMP          | LF 3,229         | \$342                | CONSTR 25.0%       |
|   | 60.01 Right of Way Acquisition  | LWU          | LF 3,229         | \$2,040              | LAND 25.0%         |
| <b>I10</b>  | <b>917+00 Additional for Long Crossing</b>                              | <b>400</b>   |                  | <b>\$3,120,000</b>   |                    |
| <b>921+00</b>   | Long Span Structure   |              |                  |                      |                    |
|   | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | GRL          | LF 400           | \$7,800              | CONSTR 25.0%       |
| <b>I10</b>  | <b>928+00 Right of Way - Dense Urban Corridor</b>                       | <b>3,921</b> |                  | <b>\$21,632,157</b>  |                    |
| <b>967+21</b>   | Right of Way Acquisition (Dense Urban)                                  |              |                  |                      |                    |
|   | 40.02 Utility Relocation along Right of Way                             | URU          | LF 3,921         | \$1,650              | CONSTR 25.0%       |
|   | 40.07 Roadway Improvements on Right of Way                              | RDW          | LF 3,921         | \$1,485              | CONSTR 25.0%       |
|   | 40.08 Traffic Protection and Control During Construction                | CMP          | LF 3,921         | \$342                | CONSTR 25.0%       |
|   | 60.01 Right of Way Acquisition  | LWU          | LF 3,921         | \$2,040              | LAND 25.0%         |
| <b>I10</b>  | <b>966+00 Additional for Long Crossing</b>                              | <b>400</b>   |                  | <b>\$3,120,000</b>   |                    |
| <b>970+00</b>   | Long Span Structure   |              |                  |                      |                    |
|   | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | GRL          | LF 400           | \$7,800              | CONSTR 25.0%       |
| <b>Subtotal Part 3: West Los Angeles to LA Union Station:</b> |   |              |                  | <b>\$650,682,951</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>UP1B</b>            | <b>21+00 HSR Elevated Section (Urban Aerial) - 2 Tracks</b>            |               |                  | <b>\$215,924,918</b> |                    |
| <b>130+00</b>          | Urban Aerial over Freight Corridor                                     | <b>35,761</b> |                  |                      |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                 | LF 35,761     | \$4,500          | \$160,924,500        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                | TRD 71,522    | \$305            | \$21,814,210         | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)  | LF 35,761     | \$275            | \$9,834,275          | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System                                    | LF 35,761     | \$22             | \$786,742            | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply  | LF 35,761     | \$141            | \$5,042,301          | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                                  | LF 35,761     | \$262            | \$9,369,382          | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                      | LF 35,761     | \$228            | \$8,153,508          | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>21+00 Right of Way - Freight Corridor</b>                           |               |                  | <b>\$18,238,110</b>  |                    |
| <b>130+00</b>          | Property Acquisition (Freight)   | <b>35,761</b> |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                                     | LF 35,761     | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LF 35,761     | \$510            | \$18,238,110         | LAND 25.0%         |
| <b>UP1B</b>            | <b>33+00 Additional for Freeway Crossing (ea)</b>                      |               |                  | <b>\$3,090,000</b>   |                    |
| <b>33+00</b>           | Freeway Crossing - 101 Freeway   | <b>1</b>      |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | LF 200        | \$7,800          | \$1,560,000          | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | LF 1,700      | \$900            | \$1,530,000          | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>45+00 Additional for Street Crossing</b>                            |               |                  | <b>\$1,350,000</b>   |                    |
| <b>45+00</b>           | Street Crossing - 4th Street   | <b>1</b>      |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | LF 1,500      | \$900            | \$1,350,000          | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>UP1B 49+00</b>      | <b>Additional for Street Crossing</b>                                  | <b>1</b>   |                  | <b>\$1,350,000</b> |                    |
| <b>49+00</b>           | Street Crossing - 6th Street   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 0             | \$0                | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,500         | \$900              | CONSTR 25.0%       |
| <b>UP1B 54+00</b>      | <b>Additional for Street Crossing</b>                                  | <b>1</b>   |                  | <b>\$1,350,000</b> |                    |
| <b>54+00</b>           | Street Crossing - 7th Street   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,500         | \$900              | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 0             | \$0                | CONSTR 25.0%       |
| <b>UP1B 60+00</b>      | <b>Additional for Freeway Crossing (ea)</b>                            | <b>1</b>   |                  | <b>\$3,090,000</b> |                    |
| <b>60+00</b>           | Freeway Crossing - Santa Monica Freeway                                |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 200           | \$7,800            | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,700         | \$900              | CONSTR 25.0%       |
| <b>UP1B 64+00</b>      | <b>Additional for Street Crossing</b>                                  | <b>1</b>   |                  | <b>\$1,350,000</b> |                    |
| <b>64+00</b>           | Olympic Boulevard  |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 0             | \$0                | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,500         | \$900              | CONSTR 25.0%       |
| <b>UP1B 118+00</b>     | <b>Additional for Freeway Crossing (ea)</b>                            | <b>1</b>   |                  | <b>\$3,090,000</b> |                    |
| <b>118+00</b>          | Long Beach Freeway   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 200           | \$7,800            | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,700         | \$900              | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>                                      | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|---|---------------|------------------|----------------------|--------------------|
| <b>UP1B 130+00</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b> | <b>22,966</b> |                  | <b>\$138,668,708</b> |                    |
| <b>200+00</b>          | Urban Aerial over Freight Corridor                    |               |                  |                      |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                | LF            | \$4,500          | \$103,347,000        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)               | TRD           | \$305            | \$14,009,260         | LOW 10.0%          |
|                        | 50.01 HSR Wayside Protection System                   | YRW           | \$22             | \$505,252            | CONSTR 25.0%       |
|                        | 50.01 HSR Signaling (ATC)                             | YRA           | \$275            | \$6,315,650          | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply                       | PRS           | \$141            | \$3,238,206          | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                 | PRD           | \$262            | \$6,017,092          | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)     | CR1           | \$228            | \$5,236,248          | CONSTR 25.0%       |

|                    |  |               |       |                     |              |
|--------------------|--|---------------|-------|---------------------|--------------|
| <b>UP1B 130+00</b> | <b>Right of Way - Freight Corridor</b>                   | <b>22,966</b> |       | <b>\$11,712,660</b> |              |
| <b>200+00</b>      | Property Acquisition (Freight)                           |               |       |                     |              |
|                    | 40.02 Utility Relocation along Right of Way              | URU           | \$0   | \$0                 | CONSTR 25.0% |
|                    | 40.07 Roadway Improvements on Right of Way               | RDW           | \$0   | \$0                 | CONSTR 25.0% |
|                    | 40.08 Flagging in Freight Corridor                       | CFL           | \$0   | \$0                 | CONSTR 25.0% |
|                    | 40.08 Traffic Protection and Control During Construction | CMP           | \$0   | \$0                 | CONSTR 25.0% |
|                    | 60.01 Right of Way Acquisition                           | LWU           | \$510 | \$11,712,660        | LAND 25.0%   |

|                    |  |          |       |                    |              |
|--------------------|--|----------|-------|--------------------|--------------|
| <b>UP1B 184+50</b> | <b>Additional for Street Crossing</b>                                  | <b>1</b> |       | <b>\$1,350,000</b> |              |
| <b>184+50</b>      | Bluff Rd   |          |       |                    |              |
|                    | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH      | \$900 | \$900              | CONSTR 25.0% |
|                    | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL      | \$0   | \$0                | CONSTR 25.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>UP1B</b>            | <b>200+00 HSR Elevated Section (Urban Aerial) - 2 Tracks</b> | <b>3,281</b> |                  | <b>\$19,810,678</b> |                    |
| <b>210+00</b>          | Transition Aerial to At-Grade (to be Elevated)               |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                       | LF 3,281     | \$4,500          | \$14,764,500        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                      | TRD 6,562    | \$305            | \$2,001,410         | LOW 10.0%          |
|                        | 50.01 HSR Wayside Protection System                          | LF 3,281     | \$22             | \$72,182            | CONSTR 25.0%       |
|                        | 50.01 HSR Signaling (ATC)                                    | LF 3,281     | \$275            | \$902,275           | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply                              | LF 3,281     | \$141            | \$462,621           | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                        | LF 3,281     | \$262            | \$859,622           | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)            | LF 3,281     | \$228            | \$748,068           | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>200+00 Right of Way - Freight Corridor</b>                | <b>3,281</b> |                  | <b>\$1,673,310</b>  |                    |
| <b>210+00</b>          | Property Acquisition (Freight)                               |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way                  | URU 0        | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                   | LF 0         | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                           | LF 3,281     | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction     | LF 0         | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition                               | LF 3,281     | \$510            | \$1,673,310         | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>  | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|---|---------------|------------------|----------------------|--------------------|
| <b>UP1B</b>            | <b>210+00 HSR Elevated Section (Urban Aerial) - 2 Tracks</b>            |               |                  | <b>\$118,858,030</b> |                    |
| <b>270+00</b>          | Urban At-Grade within Freight Corridor (to be Elevated)                 | <b>19,685</b> |                  |                      |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                  | 19,685        | \$4,500          | \$88,582,500         | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                 | 39,370        | \$305            | \$12,007,850         | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)   | 19,685        | \$275            | \$5,413,375          | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System                                     | 19,685        | \$22             | \$433,070            | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply   | 19,685        | \$141            | \$2,775,585          | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                                   | 19,685        | \$262            | \$5,157,470          | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                       | 19,685        | \$228            | \$4,488,180          | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>210+00 Right of Way - Freight Corridor</b>                           |               |                  | <b>\$10,039,350</b>  |                    |
| <b>270+00</b>          | Property Acquisition (Freight)  | <b>19,685</b> |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                             | 0             | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                              | 0             | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                                      | 19,685        | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction                | 0             | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition  | 19,685        | \$510            | \$10,039,350         | LAND 25.0%         |
| <b>UP1B</b>            | <b>214+00 Additional for Long Crossing</b>                              |               |                  | <b>\$2,558,400</b>   |                    |
| <b>215+00</b>          | San Gabriel River (Waterway)  | <b>328</b>    |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | 328           | \$7,800          | \$2,558,400          | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>227+00 Additional for Freeway Crossing (ea)</b>                      |               |                  | <b>\$3,862,500</b>   |                    |
| <b>227+00</b>          | San Gabriel River Freeway   | <b>1</b>      |                  |                      |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for High Structure      | 1,700         | \$1,125          | \$1,912,500          | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addtl for Long Span Structure | 200           | \$9,750          | \$1,950,000          | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>UP1B</b>            | <b>270+00 HSR Elevated Section (Urban Aerial) - 2 Tracks</b> | <b>45,932</b> |                  | <b>\$277,337,416</b> |                    |
| <b>410+00</b>          | Urban At-Grade within Freight Corridor (to be Elevated)      |               |                  |                      |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                       | LF            | \$4,500          | \$206,694,000        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                      | TF            | \$305            | \$28,018,520         | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)                                    | LF            | \$275            | \$12,631,300         | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System                          | LF            | \$22             | \$1,010,504          | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply                              | LF            | \$141            | \$6,476,412          | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                        | LF            | \$262            | \$12,034,184         | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)            | LF            | \$228            | \$10,472,496         | CONSTR 25.0%       |
| <b>UP1B</b>            | <b>270+00 Right of Way - Freight Corridor</b>                | <b>45,932</b> |                  | <b>\$23,425,320</b>  |                    |
| <b>410+00</b>          | Property Acquisition (Freight)                               |               |                  |                      |                    |
|                        | 40.02 Utility Relocation along Right of Way                  | URU           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                   | RDW           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction     | CMP           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                           | CFL           | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition                               | LWU           | \$510            | \$23,425,320         | LAND 25.0%         |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|------------------------|--|---------------|------------------|----------------------|--------------------|
| <b>UP1B 410+00</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b>                  |               |                  |                      |                    |
| <b>527+00</b>          | Urban At-Grade within Freight Corridor (To be Elevated)                | <b>38,386</b> |                  | <b>\$231,774,668</b> |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                 | LF 38,386     | \$4,500          | \$172,737,000        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                | TF 76,772     | \$305            | \$23,415,460         | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)  | LF 38,386     | \$275            | \$10,556,150         | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System                                    | LF 38,386     | \$22             | \$844,492            | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply  | LF 38,386     | \$141            | \$5,412,426          | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                                  | LF 38,386     | \$262            | \$10,057,132         | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                      | LF 38,386     | \$228            | \$8,752,008          | CONSTR 25.0%       |
| <b>UP1B 410+00</b>     | <b>Right of Way - Freight Corridor</b>                                 |               |                  |                      |                    |
| <b>527+00</b>          | Property Acquisition (Freight)   | <b>38,386</b> |                  | <b>\$19,576,860</b>  |                    |
|                        | 40.02 Utility Relocation along Right of Way                            | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way                             | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                                     | LF 38,386     | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction               | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition   | LF 38,386     | \$510            | \$19,576,860         | LAND 25.0%         |
| <b>UP1B 464+00</b>     | <b>Additional for Street Crossing</b>                                  |               |                  |                      |                    |
| <b>464+00</b>          | Grand Avenue   | <b>1</b>      |                  | <b>\$1,350,000</b>   |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | LF 0          | \$0              | \$0                  | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | LF 1,500      | \$900            | \$1,350,000          | CONSTR 25.0%       |
| <b>UP1B 504+00</b>     | <b>Additional for Freeway Crossing (ea)</b>                            |               |                  |                      |                    |
| <b>504+00</b>          | Orange Freeway   | <b>1</b>      |                  | <b>\$3,862,500</b>   |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | LF 1,700      | \$1,125          | \$1,912,500          | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | LF 200        | \$9,750          | \$1,950,000          | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part B: CHSRA Union Station to Pomona

| <u>Station From/To</u>                                 | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>            | <u>Contingency</u> |
|--|--|------------|------------------|------------------------|--------------------|
| UP1B 523+00  | Additional for Freeway Crossing (ea)                             | 1          |                  | \$3,862,500            |                    |
| 523+00   | Chino Valley Freeway   |            |                  |                        |                    |
| 10.04  | Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,700         | \$1,125                | CONSTR 25.0%       |
| 10.04  | Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 200           | \$9,750                | CONSTR 25.0%       |
| <b>Subtotal Part B: CHSRA Union Station to Pomona:</b> |  |            |                  | <b>\$1,118,555,928</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>        | <u>Contingency</u> |
|------------------------|--|------------|------------------|--------------------|--------------------|
| <b>UP1A 220+00</b>     | <b>Additional for Street Crossing</b>                                  | <b>1</b>   |                  | <b>\$1,350,000</b> |                    |
| <b>220+00</b>          | Beverly Avenue   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,500         | \$900              | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 0             | \$0                | CONSTR 25.0%       |
| <b>UP1A 270+00</b>     | <b>Additional for Freeway Crossing (ea)</b>                            | <b>1</b>   |                  | <b>\$3,090,000</b> |                    |
| <b>270+00</b>          | Pomona Freeway   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,700         | \$900              | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 200           | \$7,800            | CONSTR 25.0%       |
| <b>UP1A 328+00</b>     | <b>Additional for Street Crossing</b>                                  | <b>1</b>   |                  | <b>\$1,350,000</b> |                    |
| <b>328+00</b>          | Hacienda Blvd  |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,500         | \$900              | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 0             | \$0                | CONSTR 25.0%       |
| <b>UP1A 497+00</b>     | <b>Additional for Street Crossing</b>                                  | <b>1</b>   |                  | <b>\$1,350,000</b> |                    |
| <b>497+00</b>          | Humane Way   |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 0             | \$0                | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,500         | \$900              | CONSTR 25.0%       |
| <b>UP1A 498+50</b>     | <b>Additional for Street Crossing</b>                                  | <b>1</b>   |                  | <b>\$1,350,000</b> |                    |
| <b>498+50</b>          | W Temple Avenue  |            |                  |                    |                    |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF 1,500         | \$900              | CONSTR 25.0%       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF 0             | \$0                | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>                                      | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |        |       |
|------------------------|---|---------------|------------------|----------------------|--------------------|--------|-------|
| <b>UP1A 502+00</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b> | <b>3,281</b>  |                  | <b>\$19,810,678</b>  |                    |        |       |
| <b>512+00</b>          | Transition At Grade to Aerial                         |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                | GRE           | LF               | 3,281                | \$4,500            | CONSTR | 25.0% |
|                        | 10.09 HSR Track on Structure (2 Tracks)               | TRD           | TF               | 6,562                | \$305              | LOW    | 10.0% |
|                        | 50.01 HSR Signaling (ATC)                             | YRA           | LF               | 3,281                | \$275              | CONSTR | 25.0% |
|                        | 50.01 HSR Wayside Protection System                   | YRW           | LF               | 3,281                | \$22               | CONSTR | 25.0% |
|                        | 50.03 HSR Traction Power Supply                       | PRS           | LF               | 3,281                | \$141              | CONSTR | 25.0% |
|                        | 50.04 HSR Traction Power Distribution                 | PRD           | LF               | 3,281                | \$262              | CONSTR | 25.0% |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)     | CR1           | LF               | 3,281                | \$228              | CONSTR | 25.0% |
| <b>UP1A 512+00</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b> | <b>28,871</b> |                  | <b>\$174,323,098</b> |                    |        |       |
| <b>600+00</b>          | Urban Aerial over Freight Corridor                    |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                | GRE           | LF               | 28,871               | \$4,500            | CONSTR | 25.0% |
|                        | 10.09 HSR Track on Structure (2 Tracks)               | TRD           | TF               | 57,742               | \$305              | LOW    | 10.0% |
|                        | 50.01 HSR Signaling (ATC)                             | YRA           | LF               | 28,871               | \$275              | CONSTR | 25.0% |
|                        | 50.01 HSR Wayside Protection System                   | YRW           | LF               | 28,871               | \$22               | CONSTR | 25.0% |
|                        | 50.03 HSR Traction Power Supply                       | PRS           | LF               | 28,871               | \$141              | CONSTR | 25.0% |
|                        | 50.04 HSR Traction Power Distribution                 | PRD           | LF               | 28,871               | \$262              | CONSTR | 25.0% |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)     | CR1           | LF               | 28,871               | \$228              | CONSTR | 25.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>    | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |        |       |
|------------------------|--|---------------|------------------|----------------------|--------------------|--------|-------|
| <b>UP1A 538+40</b>     | <b>Right of Way - Freight Corridor</b>                                 | <b>20,210</b> |                  | <b>\$10,307,100</b>  |                    |        |       |
| <b>600+00</b>          | Property Acquisition (Freight)   |               |                  |                      |                    |        |       |
|                        | 40.02 Utility Relocation along Right of Way                            | URU           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.07 Roadway Improvements on Right of Way                             | RDW           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.08 Traffic Protection and Control During Construction               | CMP           | LF               | 0                    | \$0                | CONSTR | 25.0% |
|                        | 40.08 Flagging in Freight Corridor                                     | CFL           | LF               | 20,210               | \$0                | CONSTR | 25.0% |
|                        | 60.01 Right of Way Acquisition   | LWU           | LF               | 20,210               | \$510              | LAND   | 25.0% |
| <b>UP1A 538+40</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b>                  | <b>36,614</b> |                  | <b>\$221,075,332</b> |                    |        |       |
| <b>650+00</b>          | Urban Aerial over Freight Corridor                                     |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                                 | GRE           | LF               | 36,614               | \$4,500            | CONSTR | 25.0% |
|                        | 10.09 HSR Track on Structure (2 Tracks)                                | TRD           | TF               | 73,228               | \$305              | LOW    | 10.0% |
|                        | 50.01 HSR Wayside Protection System                                    | YRW           | LF               | 36,614               | \$22               | CONSTR | 25.0% |
|                        | 50.01 HSR Signaling (ATC)  | YRA           | LF               | 36,614               | \$275              | CONSTR | 25.0% |
|                        | 50.03 HSR Traction Power Supply  | PRS           | LF               | 36,614               | \$141              | CONSTR | 25.0% |
|                        | 50.04 HSR Traction Power Distribution                                  | PRD           | LF               | 36,614               | \$262              | CONSTR | 25.0% |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)                      | CR1           | LF               | 36,614               | \$228              | CONSTR | 25.0% |
| <b>UP1A 591+50</b>     | <b>Additional for Street Crossing</b>                                  | <b>1</b>      |                  | <b>\$1,350,000</b>   |                    |        |       |
| <b>591+50</b>          | Central Avenue Overpass  |               |                  |                      |                    |        |       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH           | LF               | 1,500                | \$900              | CONSTR | 25.0% |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL           | LF               | 0                    | \$0                | CONSTR | 25.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |        |       |
|------------------------|--|------------|------------------|-------------|--------------------|--------|-------|
| UP1A 600+00            | Right of Way - Freight Corridor  | 16,404     |                  | \$8,366,040 |                    |        |       |
| 650+00                 | Property Acquisition (Freight)   |            |                  |             |                    |        |       |
|                        | 40.02 Utility Relocation along Right of Way                            | URU        | LF               | 0           | \$0                | CONSTR | 25.0% |
|                        | 40.07 Roadway Improvements on Right of Way                             | RDW        | LF               | 0           | \$0                | CONSTR | 25.0% |
|                        | 40.08 Traffic Protection and Control During Construction               | CMP        | LF               | 0           | \$0                | CONSTR | 25.0% |
|                        | 40.08 Flagging in Freight Corridor                                     | CFL        | LF               | 16,404      | \$0                | CONSTR | 25.0% |
|                        | 60.01 Right of Way Acquisition   | LWU        | LF               | 16,404      | \$510              | LAND   | 25.0% |
| UP1A 608+00            | <b>Additional for Street Crossing</b>                                  | 1          |                  | \$1,350,000 |                    |        |       |
| 608+00                 | Mountain Avenue Overpass   |            |                  |             |                    |        |       |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF               | 0           | \$0                | CONSTR | 25.0% |
|                        | 10.04 Elevated HSR Structure (2 Tracks) - Addl for High Structure      | GRH        | LF               | 1,500       | \$900              | CONSTR | 25.0% |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>UP1A 650+00</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b>    | <b>3,281</b> |                  | <b>\$19,810,678</b> |                    |
| <b>660+00</b>          | Transition Aerial to At-Grade                            |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                   | GRE LF       | \$4,500          | \$14,764,500        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                  | TRD TF       | \$305            | \$2,001,410         | LOW 10.0%          |
|                        | 50.01 HSR Wayside Protection System                      | YRW LF       | \$22             | \$72,182            | CONSTR 25.0%       |
|                        | 50.01 HSR Signaling (ATC)                                | YRA LF       | \$275            | \$902,275           | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply                          | PRS LF       | \$141            | \$462,621           | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                    | PRD LF       | \$262            | \$859,622           | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)        | CR1 LF       | \$228            | \$748,068           | CONSTR 25.0%       |
| <b>UP1A 650+00</b>     | <b>Right of Way - Freight Corridor</b>                   | <b>3,281</b> |                  | <b>\$1,673,310</b>  |                    |
| <b>660+00</b>          | Property Acquisition (Freight)                           |              |                  |                     |                    |
|                        | 40.02 Utility Relocation along Right of Way              | URU LF       | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.07 Roadway Improvements on Right of Way               | RDW LF       | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Traffic Protection and Control During Construction | CMP LF       | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 40.08 Flagging in Freight Corridor                       | CFL LF       | \$0              | \$0                 | CONSTR 25.0%       |
|                        | 60.01 Right of Way Acquisition                           | LWU LF       | \$510            | \$1,673,310         | LAND 25.0%         |
| <b>UP1A 660+00</b>     | <b>HSR Elevated Section (Urban Aerial) - 2 Tracks</b>    | <b>5,938</b> |                  | <b>\$35,853,644</b> |                    |
| <b>678+10</b>          | Urban At-Grade within Freight Corridor                   |              |                  |                     |                    |
|                        | 10.04 Elevated HSR Guideway (2 Tracks)                   | GRE LF       | \$4,500          | \$26,721,000        | CONSTR 25.0%       |
|                        | 10.09 HSR Track on Structure (2 Tracks)                  | TRD TF       | \$305            | \$3,622,180         | LOW 10.0%          |
|                        | 50.01 HSR Signaling (ATC)                                | YRA LF       | \$275            | \$1,632,950         | CONSTR 25.0%       |
|                        | 50.01 HSR Wayside Protection System                      | YRW LF       | \$22             | \$130,636           | CONSTR 25.0%       |
|                        | 50.03 HSR Traction Power Supply                          | PRS LF       | \$141            | \$837,258           | CONSTR 25.0%       |
|                        | 50.04 HSR Traction Power Distribution                    | PRD LF       | \$262            | \$1,555,756         | CONSTR 25.0%       |
|                        | 50.05 HSR Communications (w/Fiber Optic Backbone)        | CR1 LF       | \$228            | \$1,353,864         | CONSTR 25.0%       |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Part A: CHSRA - Pomona to Ontario Airport

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|------------------------|--|------------|------------------|-------------|--------------------|
| UP1B 270+00            | Additional for Long Crossing                                     | 100        |                  | \$780,000   |                    |
| 271+00                 | Pomona Freeway   |            |                  |             |                    |
| 10.04                  | Elevated HSR Structure (2 Tracks) - Addl for Long Span Structure | GRL        | LF               | \$7,800     | 25.0%              |
|                        |  |            |                  | \$780,000   | CONSTR             |

Subtotal Part A: CHSRA - Pomona to Ontario Airport: **\$503,189,880**

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Ontario Airport Station

| <u>Station From/To</u>                   | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|--|--|--------------|------------------|----------------------|--------------------|
| <b>110 2947+51</b>                       | <b>Elevated Station (Center-Side Platform)</b>               | <b>1</b>     |                  | <b>\$94,138,000</b>  |                    |
| <b>2956+11</b>                           | Ontario Airport Station                                      |              |                  |                      |                    |
|  | 20.02 Elevated Station - Center-Side Platform with Mezzanine | EA           | \$85,800,000     | \$85,800,000         | CONSTR 25.0%       |
|  | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000          | LAND 25.0%         |
|  | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$6,458,000          | LAND 25.0%         |
| <b>110 2947+51</b>                       | <b>Parking Deck Spaces</b>                                   | <b>2,000</b> |                  | <b>\$44,710,000</b>  |                    |
| <b>2956+11</b>                           | Parking at Ontario Airport                                   |              |                  |                      |                    |
|  | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$40,950,000         | CONSTR 25.0%       |
|  | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$3,760,000          | LAND 25.0%         |
| <b>Subtotal Ontario Airport Station:</b> |  |              |                  | <b>\$138,848,000</b> |                    |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Stations - CAHSRA Alignment

| <u>Station From/To</u> | <u>Cost Item</u>   | <u>Qty</u>   | <u>Unit Cost</u> | <u>Cost</u>         | <u>Contingency</u> |
|------------------------|--|--------------|------------------|---------------------|--------------------|
| <b>110</b>             | <b>107+06 Elevated Station (Center Platform)</b>             | <b>1</b>     |                  | <b>\$53,386,000</b> |                    |
| <b>113+86</b>          | West Los Angeles Station                                     |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center Platform                     | EA           | \$47,200,000     | \$47,200,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$4,306,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>110</b>             | <b>107+06 Parking Deck Spaces</b>                            | <b>1,000</b> |                  | <b>\$22,355,000</b> |                    |
| <b>113+86</b>          | Parking at West Los Angeles Station                          |              |                  |                     |                    |
|                        | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$20,475,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>UP1B</b>            | <b>21+00 Elevated Station (Center-Side Platform)</b>         | <b>1</b>     |                  | <b>\$94,138,000</b> |                    |
| <b>21+00</b>           | LA Union Station   |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center-Side Platform with Mezzanine | EA           | \$85,800,000     | \$85,800,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$6,458,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>UP1B</b>            | <b>444+55 Elevated Station (Center Platform)</b>             | <b>1</b>     |                  | <b>\$53,386,000</b> |                    |
| <b>448+55</b>          | City of Industry Station                                     |              |                  |                     |                    |
|                        | 20.02 Elevated Station - Center Platform                     | EA           | \$47,200,000     | \$47,200,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$1,880,000         | LAND               |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$4,306,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |
| <b>UP1B</b>            | <b>444+55 Parking Deck Spaces</b>                            | <b>2,000</b> |                  | <b>\$44,710,000</b> |                    |
| <b>448+55</b>          | Parking at City of Industry Station                          |              |                  |                     |                    |
|                        | 20.06 Parking Space - Deck                                   | SP           | \$20,475         | \$40,950,000        | CONSTR             |
|                        | 60.01 Land Acquisition for Yards and Stations                | SF           | \$20             | \$3,760,000         | LAND               |
|                        |  |              |                  |                     | 25.0%              |
|                        |  |              |                  |                     | 25.0%              |

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Stations - CAHSRA Alignment

| <u>Station From/To</u> | <u>Cost Item</u> | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u> | <u>Contingency</u> |
|------------------------|------------------|------------|------------------|-------------|--------------------|
|------------------------|------------------|------------|------------------|-------------|--------------------|

Subtotal Stations - CAHSRA Alignment: \$267,975,000

# SCAG High Speed Regional Transportation Systems Alternatives Analysis Study

## Takeoff Details with Unit Costs

SWT on UPRR Alignment

### Ontario Maintenance Facility

| <u>Station From/To</u>                        | <u>Cost Item</u>                    | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>          | <u>Contingency</u> |
|---|-------------------------------------|------------|------------------|----------------------|--------------------|
| <b>HSR - Central Maintenance Facility</b>     |                                     |            |                  |                      |                    |
| Central Maintenance Facility - HSR            |                                     |            |                  |                      |                    |
| 30.02   | HSR Heavy Maintenance Facility      | SF         | 306,800          | \$343                | 25.0%              |
| 30.02   | HSR Heavy Maintenance Equipment     | EA         | 1                | \$5,300,000          | 25.0%              |
| 30.02   | HSR Material Storage Facility       | SF         | 67,800           | \$179                | 25.0%              |
| 30.02   | HSR S&I Shop Equipment              | EA         | 1                | \$2,300,000          | 25.0%              |
| 30.02   | HSR Service and Inspection Facility | SF         | 36,600           | \$343                | 25.0%              |
| 30.02   | HSR Car Wash Facility               | EA         | 1                | \$2,500,000          | 25.0%              |
| 30.05   | HSR Yard Tracks                     | EA         | 8                | \$2,100,000          | 25.0%              |
|   |                                     |            |                  | <b>\$156,822,400</b> |                    |
| <b>Subtotal Ontario Maintenance Facility:</b> |                                     |            |                  | <b>\$156,822,400</b> |                    |

# *SCAG High Speed Regional Transportation Systems Alternatives Analysis Study*

## *Takeoff Details with Unit Costs*

SWT on UPRR Alignment

| <u>Station From/To</u> | <u>Cost Item</u>            | <u>Qty</u> | <u>Unit Cost</u> | <u>Cost</u>                    | <u>Contingency</u>   |
|------------------------|-----------------------------|------------|------------------|--------------------------------|----------------------|
|                        | <b>High Speed Trainsets</b> |            |                  |                                |                      |
|                        | High Speed Trainsets        | 7          |                  | \$210,000,000                  |                      |
| 70.03                  | High Speed Trainsets        |            |                  |                                |                      |
|                        | VTH                         | 7          | \$30,000,000     | \$210,000,000                  | VEH_SWT 10.0%        |
|                        |                             |            |                  | <b>Subtotal Revenue Fleet:</b> | <b>\$210,000,000</b> |

**Total SWT on UPRR Alignment: \$3,046,074,159**

## 7.0 HSRT Speed Profiles – LAX Extension

The HSRT AA evaluated extending the HSRT system from West Los Angeles to Los Angeles International Airport (LAX). This appendix shows the speed profiles for this extension using both Maglev and high-speed steel-wheel technologies. Further information on the LAX extension may be found in Section 12.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*. The speed profiles were developed using SYSTRA's RAILSIM® Train Performance Calculator.

Figure 7.1 LAX to West LA Speed Profile, Maglev, Eastbound

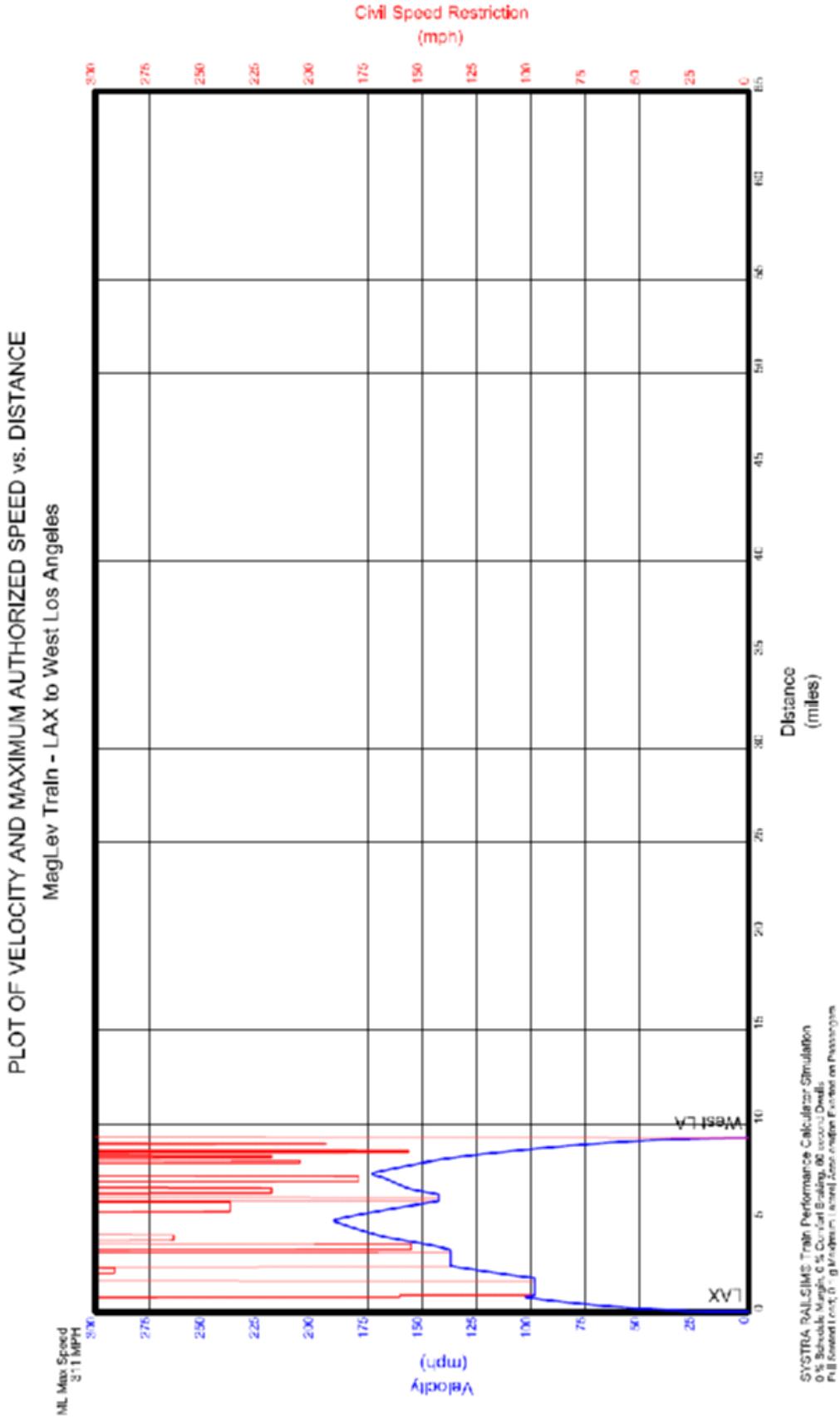


Figure 7.2 LAX to West LA Speed Profile, Steel-Wheel, Eastbound

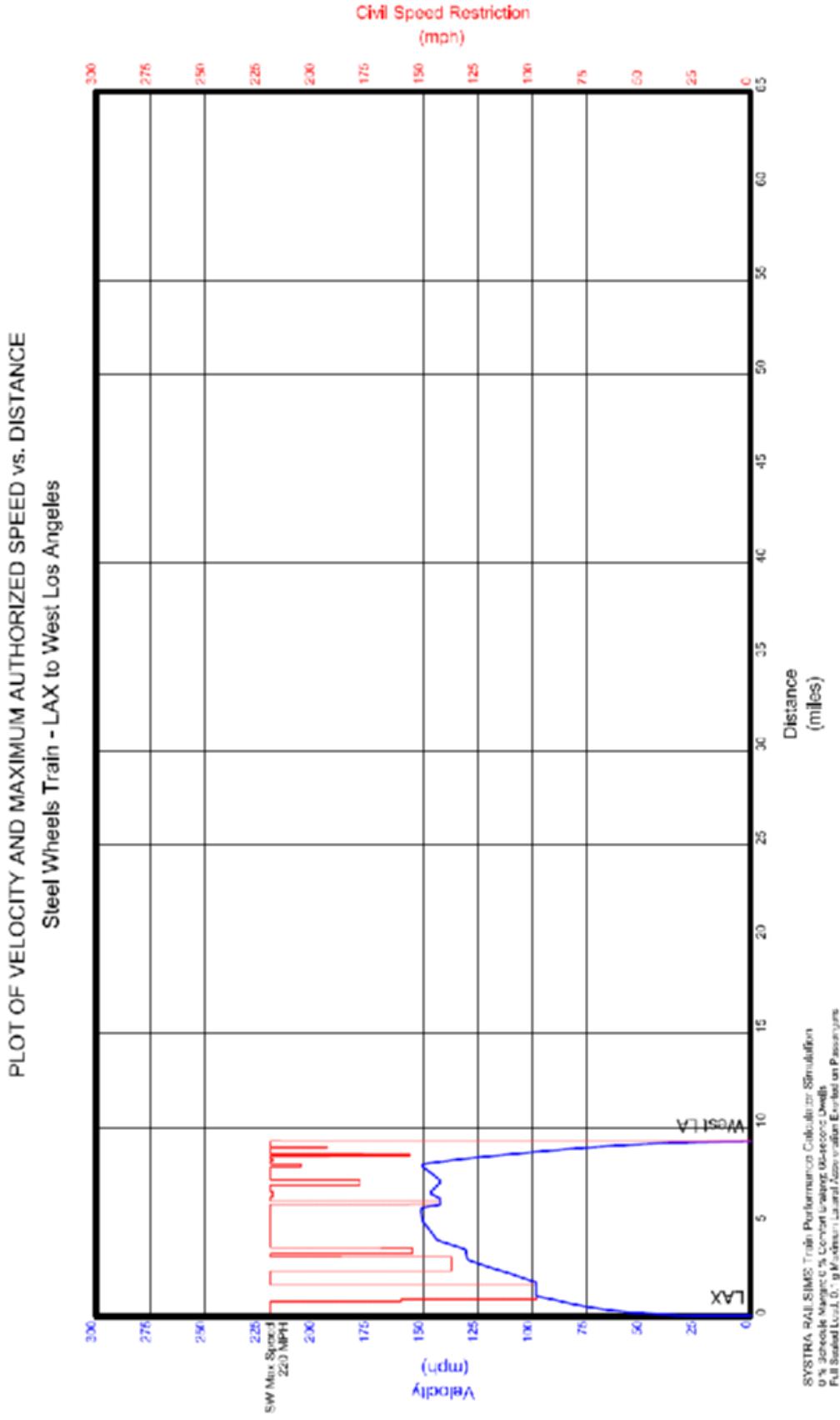


Figure 7.3 West LA to LAX Speed Profile, Maglev, Westbound

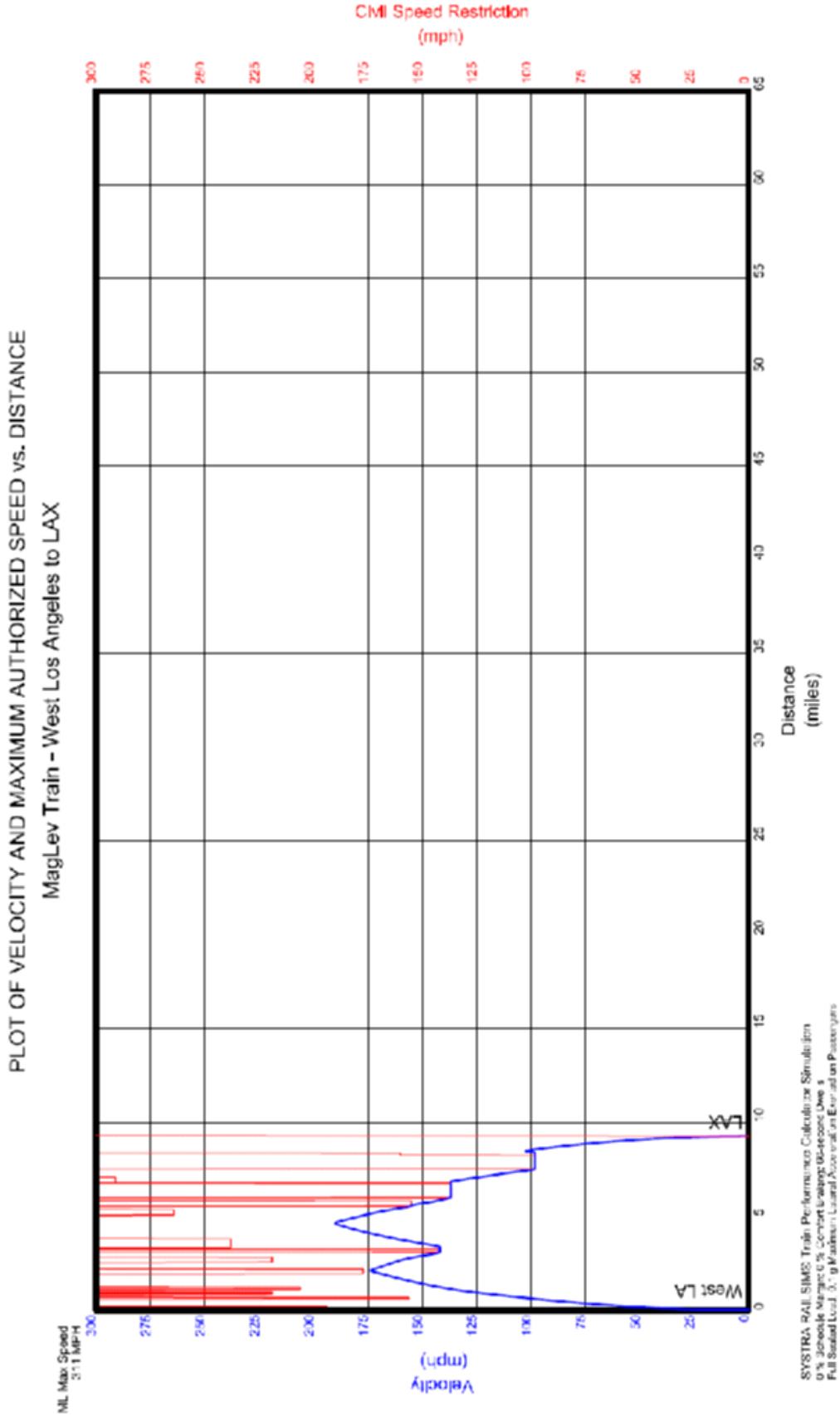
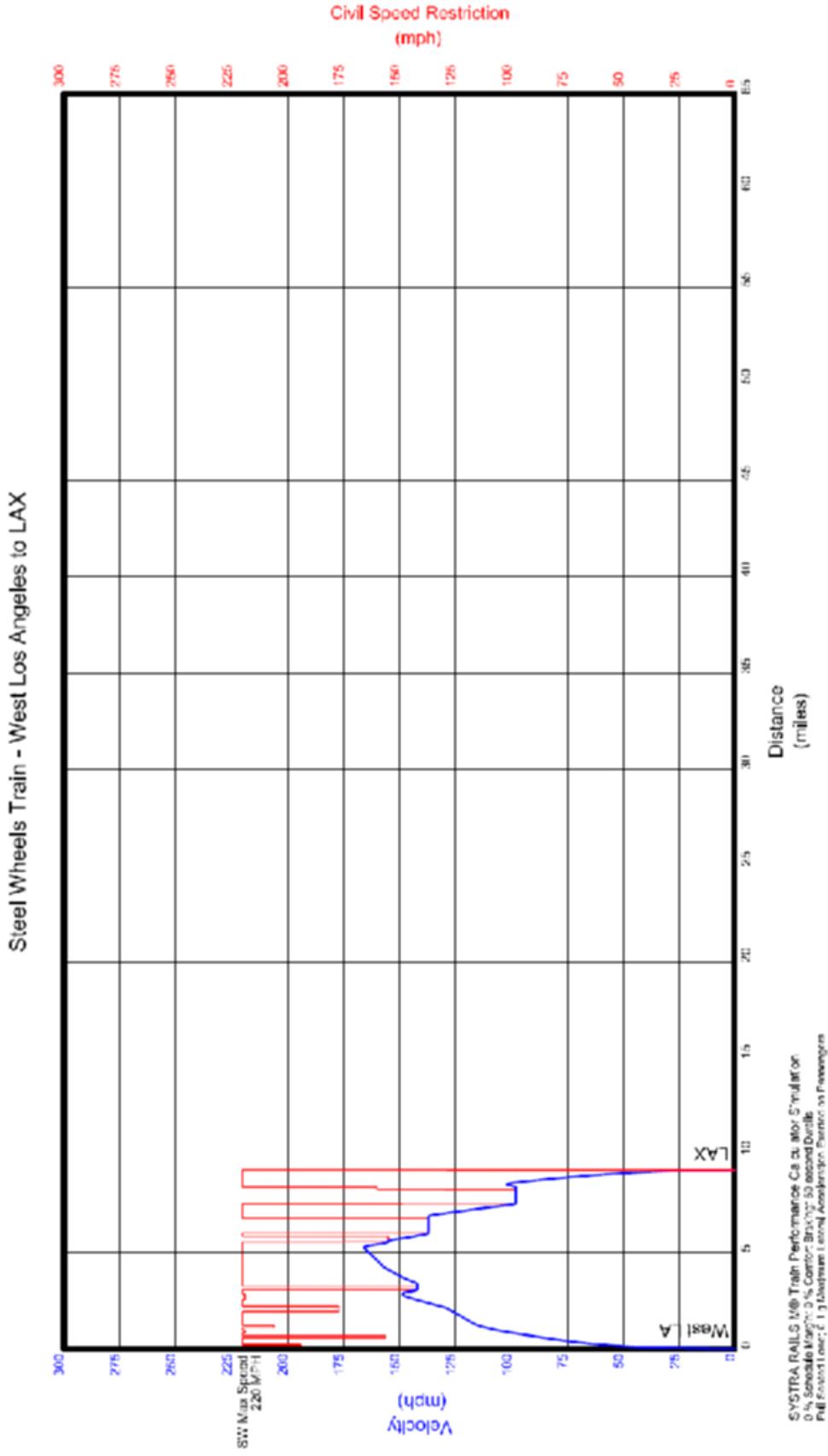


Figure 7.4 West LA to LAX Speed Profile, Steel-Wheel, Westbound

PLOT OF VELOCITY AND MAXIMUM AUTHORIZED SPEED vs. DISTANCE





## 8.0 Local Transit Route Adjustments – LAX Extension

This appendix shows the reroutings made to local transit services to serve a possible LAX HSRT station. Year 2025 transit routes in the vicinity of the proposed LAX HSRT station were obtained from the SCAG travel demand model. Routes that passed roughly within one mile of the proposed HSRT station were rerouted to serve the station. These are shown in Figure 8.1 to Figure 8.34. The purple circles in the figures indicate a radius of two miles around the HSRT station. The black lines indicate future year transit routes without the HSRT system. The dotted yellow and blue lines indicate adjustments to feed the HSRT station. No modifications were made to local transit route frequencies or hours of service.

Figure 8.1 Adjustment to Metro Route 439, Northbound

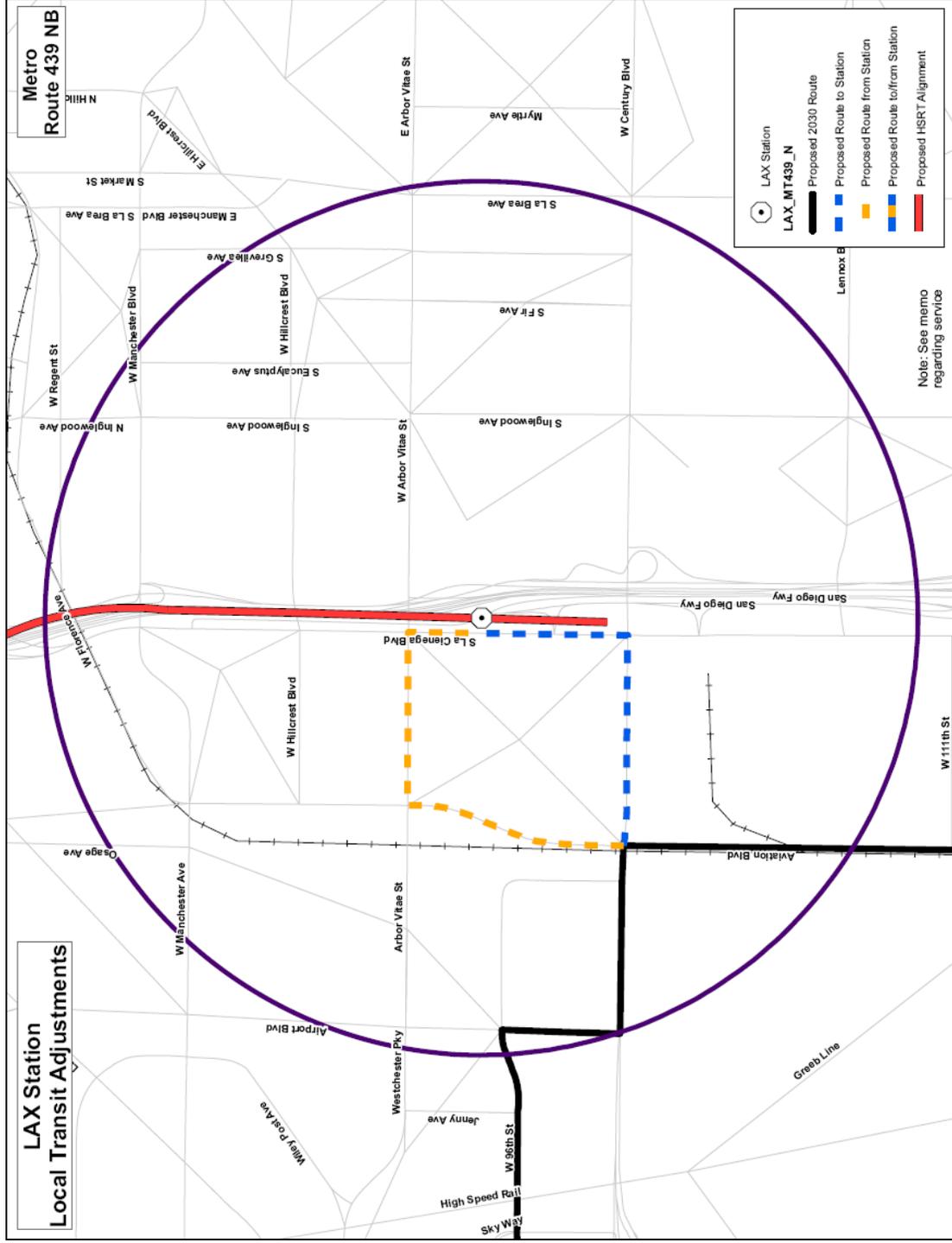


Figure 8.2 Adjustment to Metro Route 439, Southbound

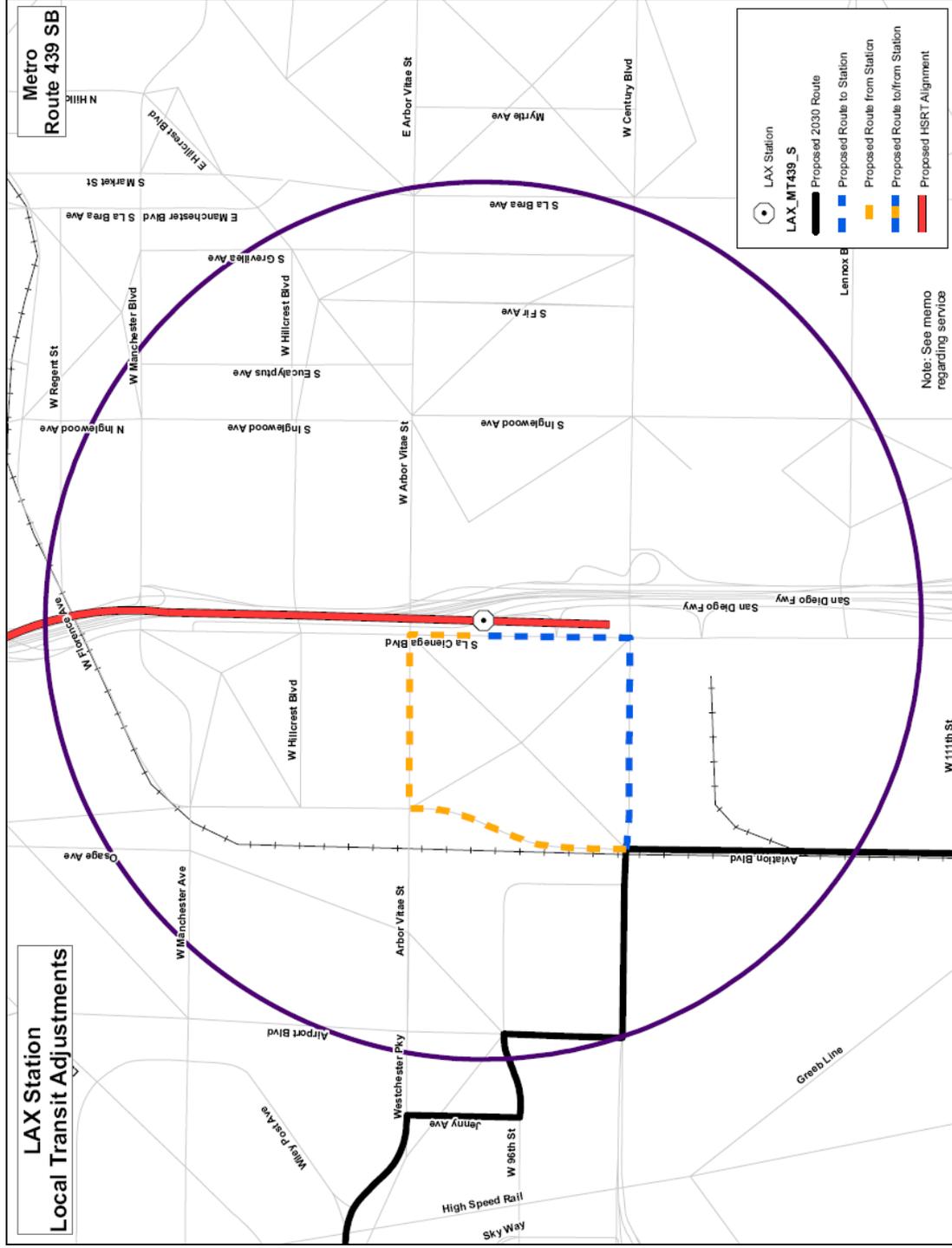


Figure 8.3 Adjustment to Metro Route 703, Northbound

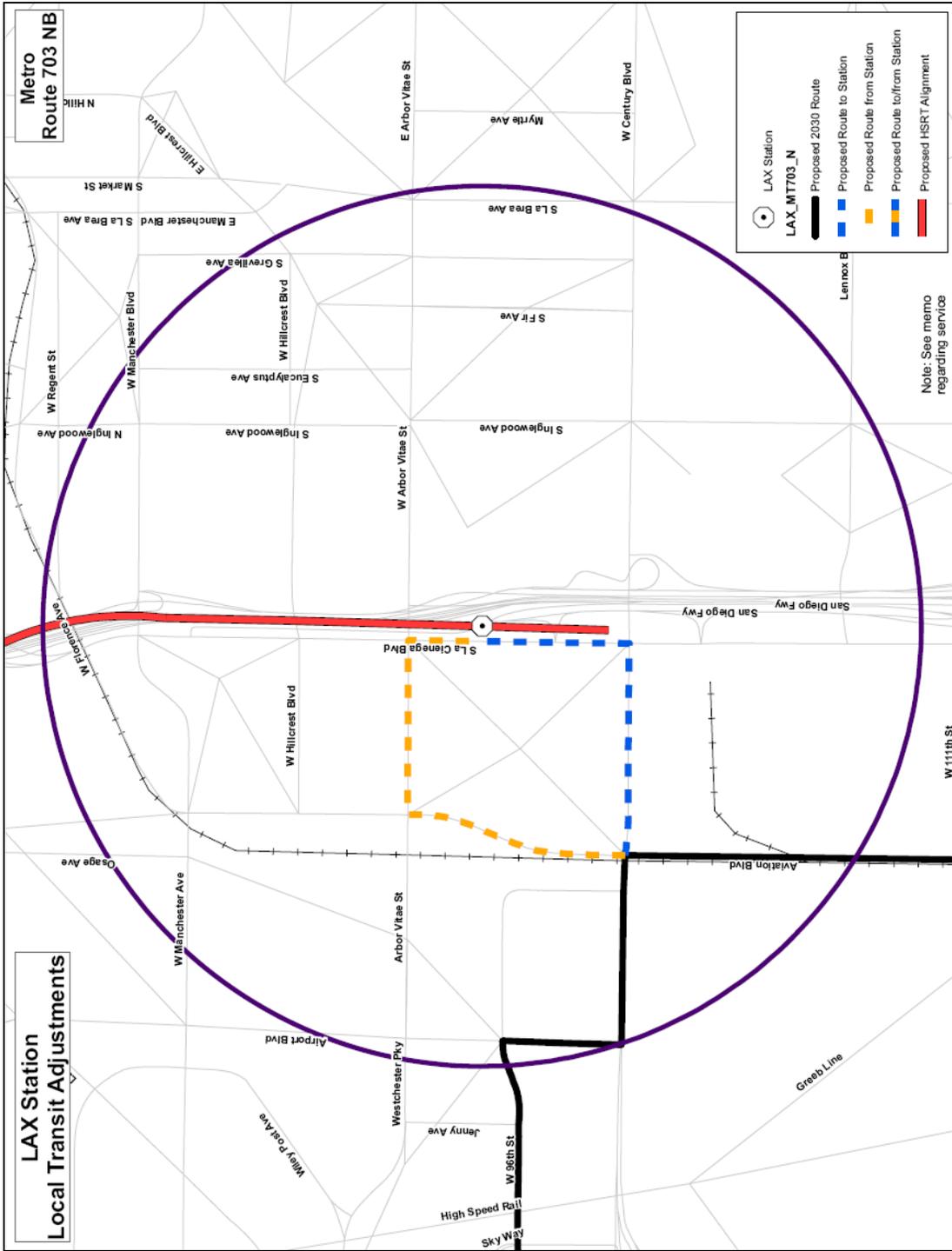




Figure 8.5 Adjustment to Metro Route 706, Northbound

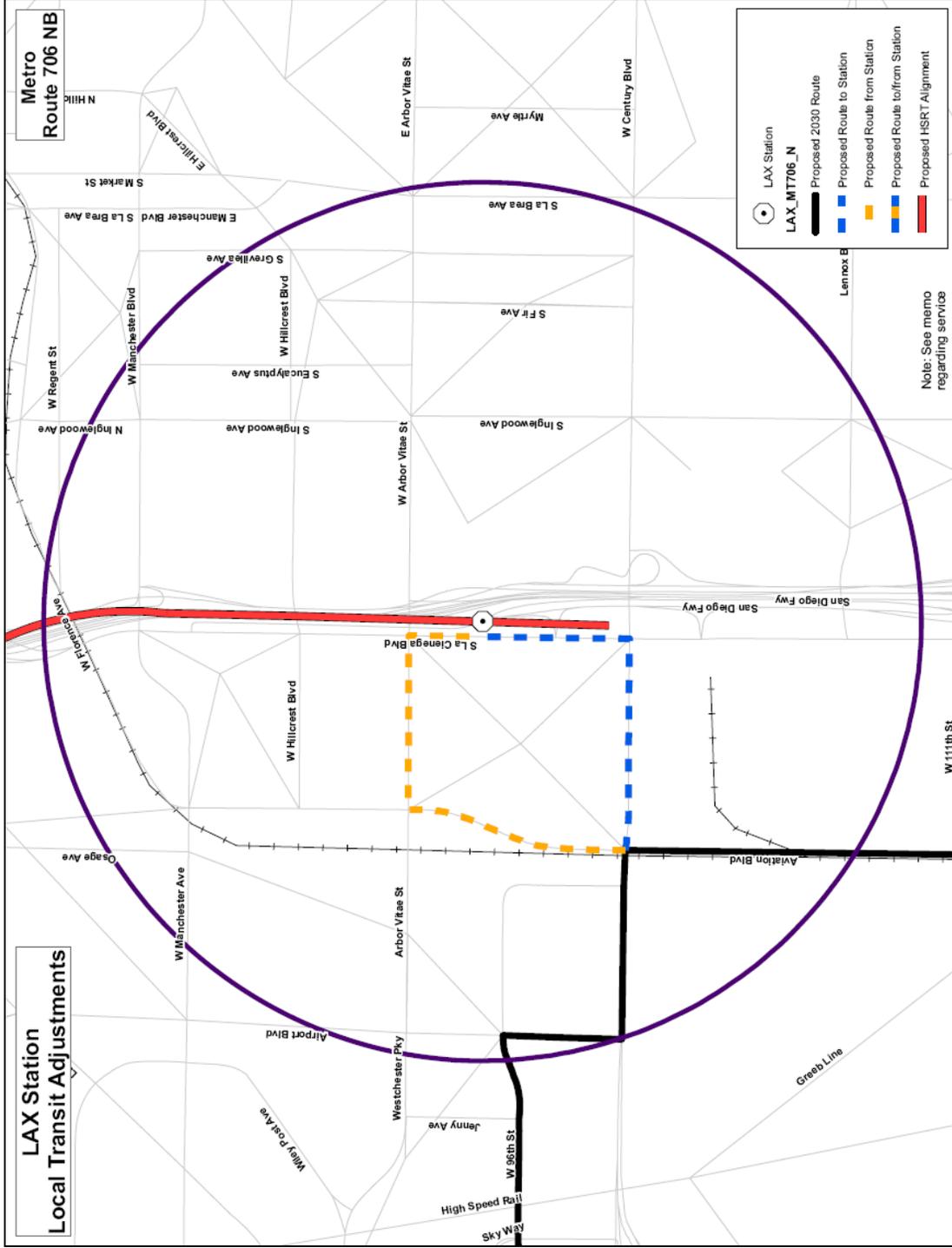


Figure 8.6 Adjustment to Metro Route 706, Southbound

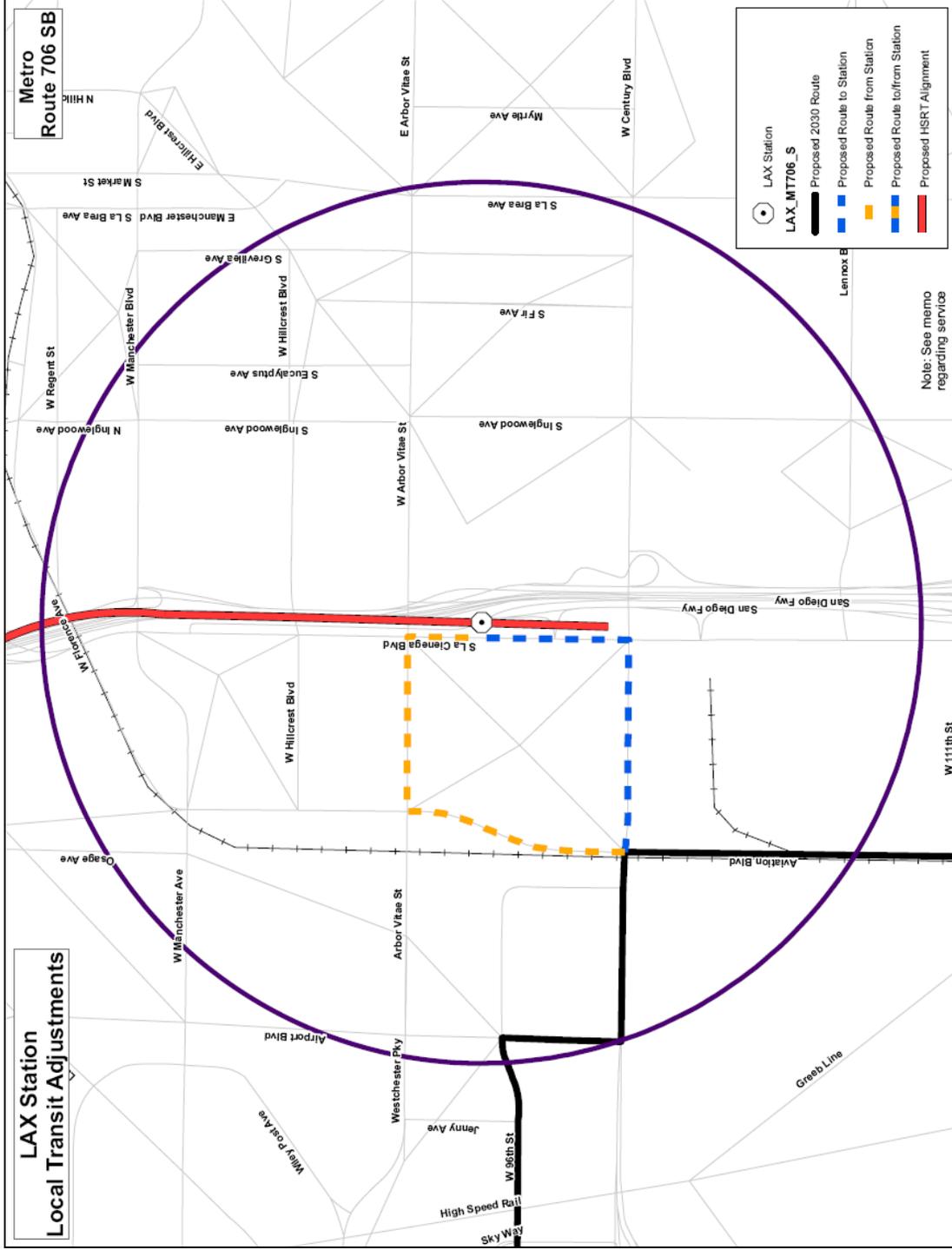


Figure 8.7 Adjustment to Metro Route 715, Eastbound

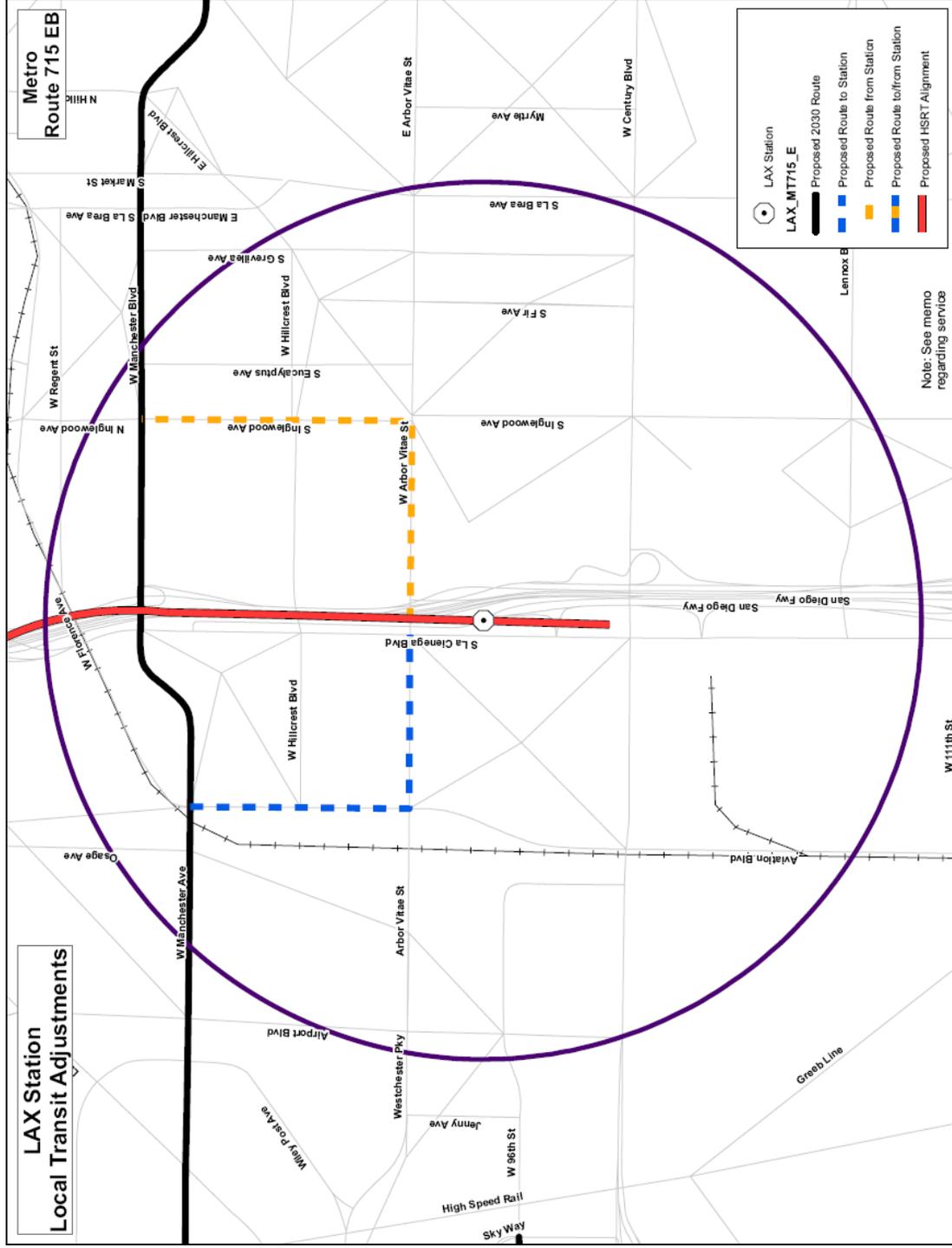


Figure 8.8 Adjustment to Metro Route 715, Westbound

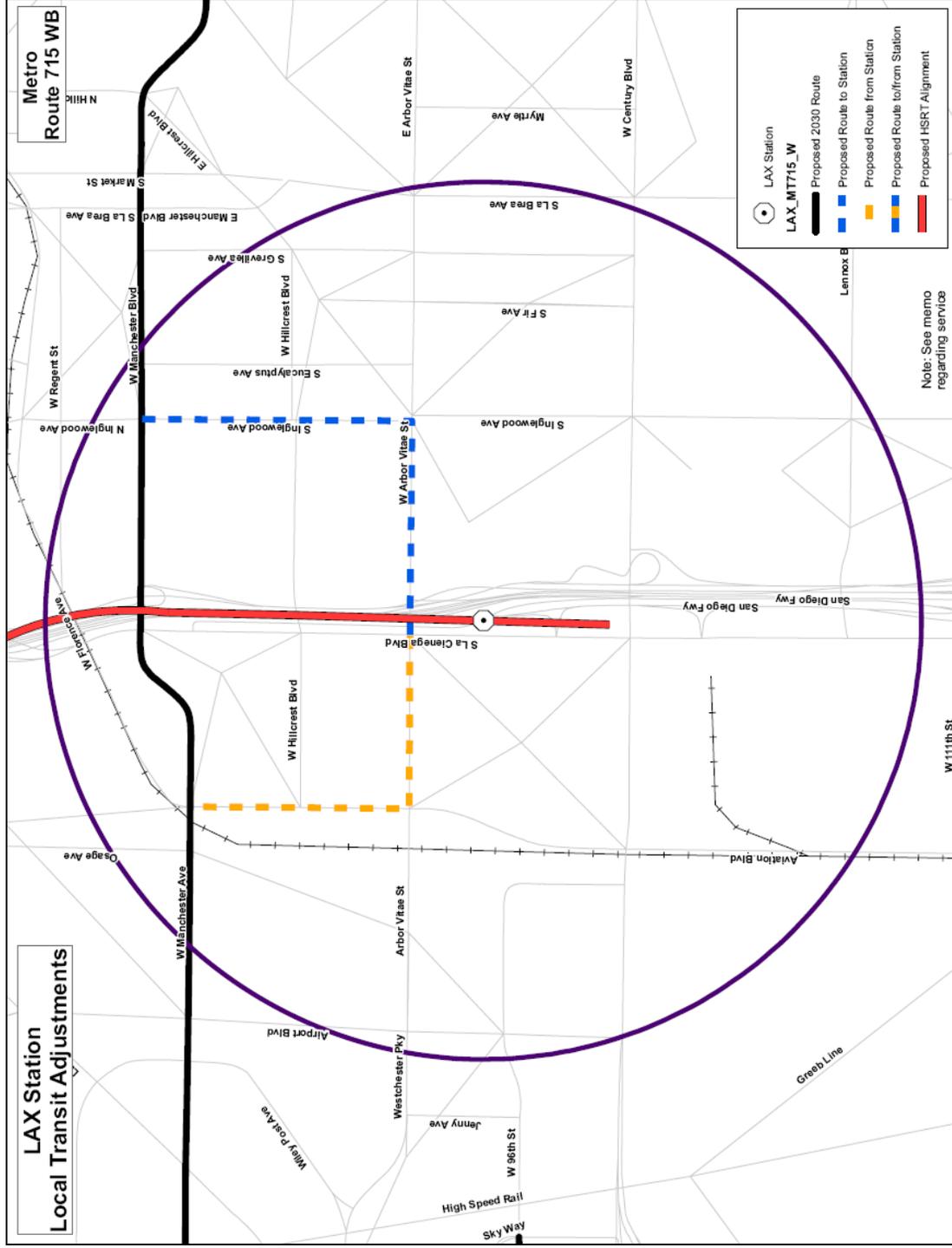


Figure 8.9 Adjustment to Metro Route 111, Westbound

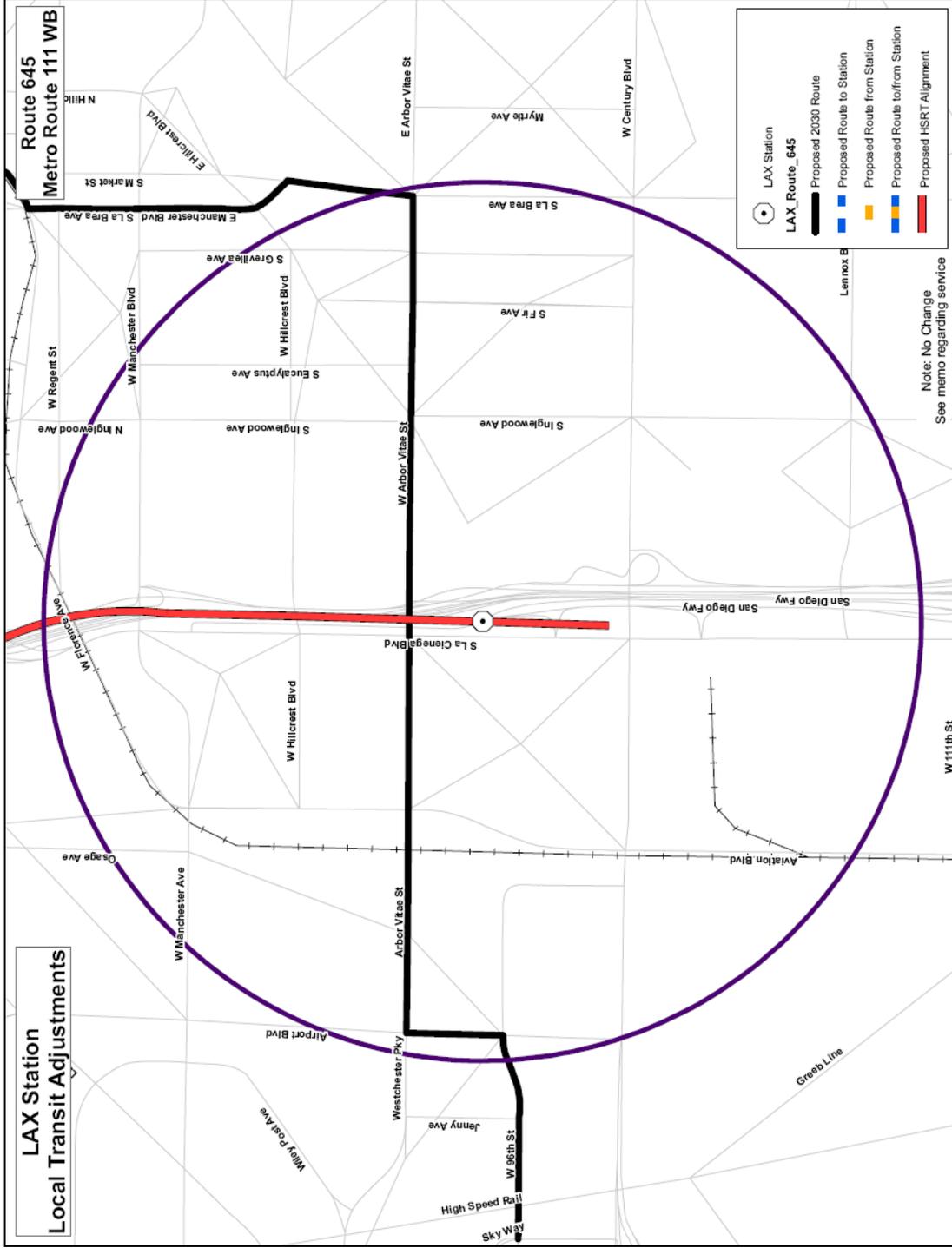


Figure 8.10 Adjustment to Metro Route 111, Eastbound

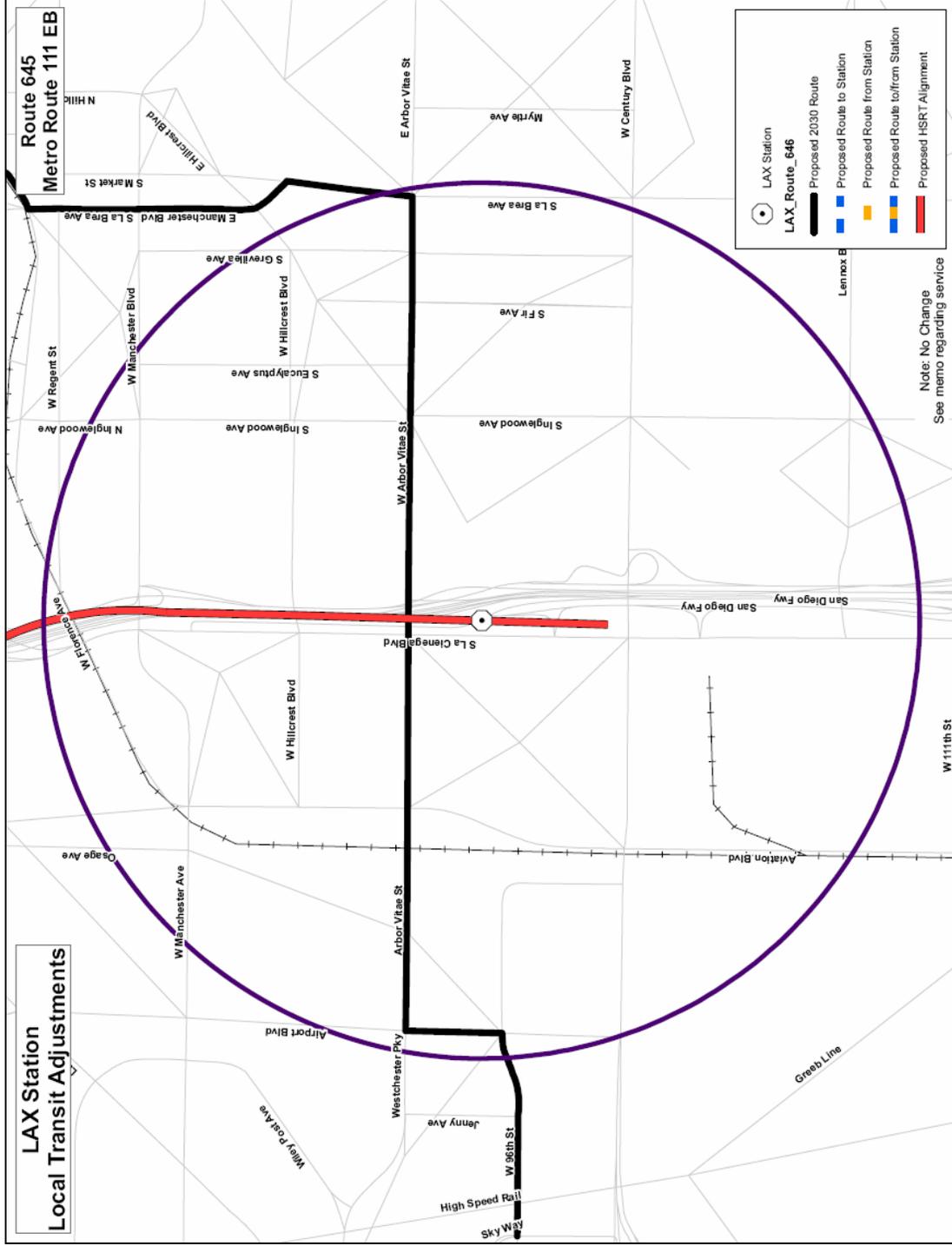


Figure 8.11 Adjustment to Metro Route 115, Eastbound

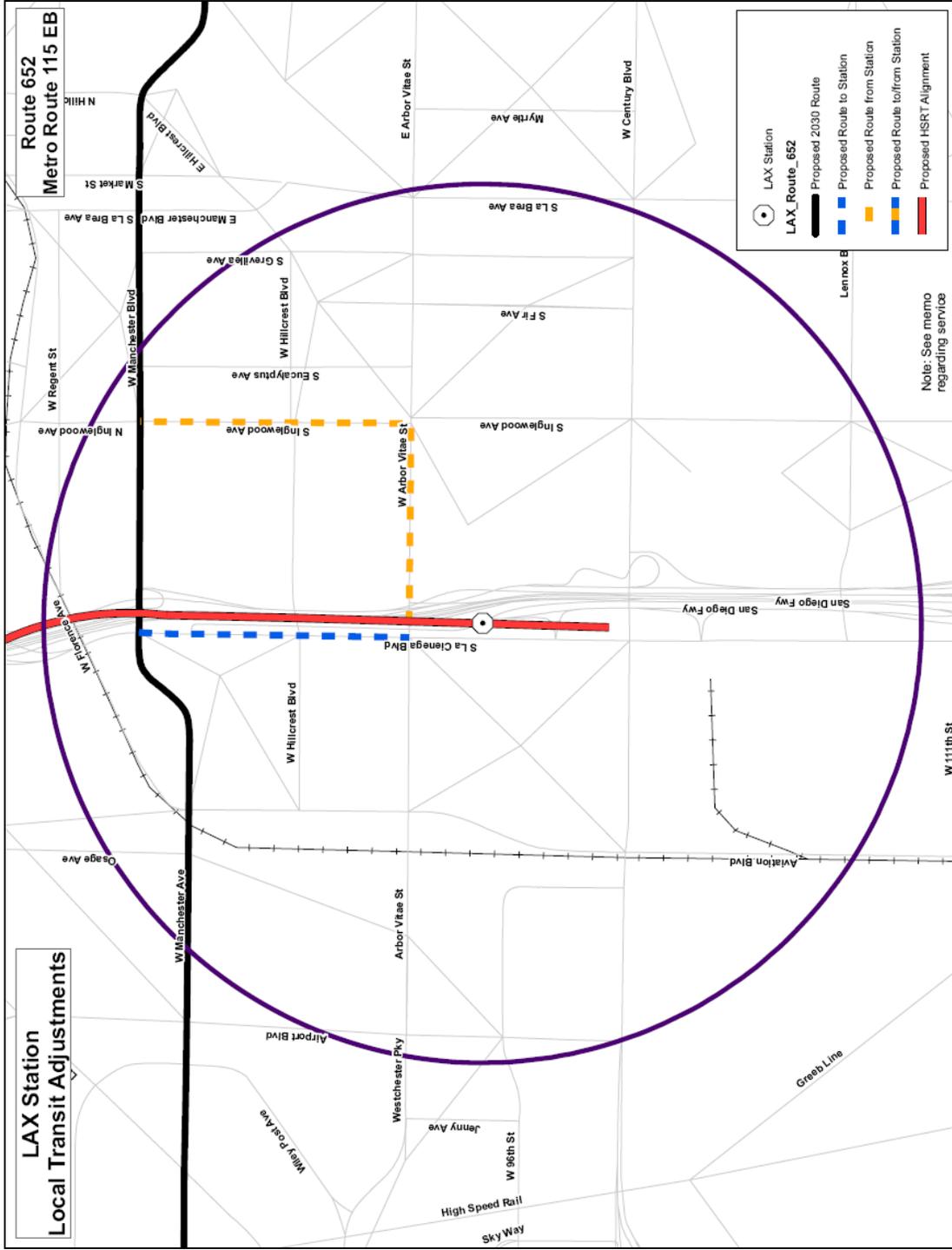


Figure 8.12 Adjustment to Metro Route 115, Eastbound

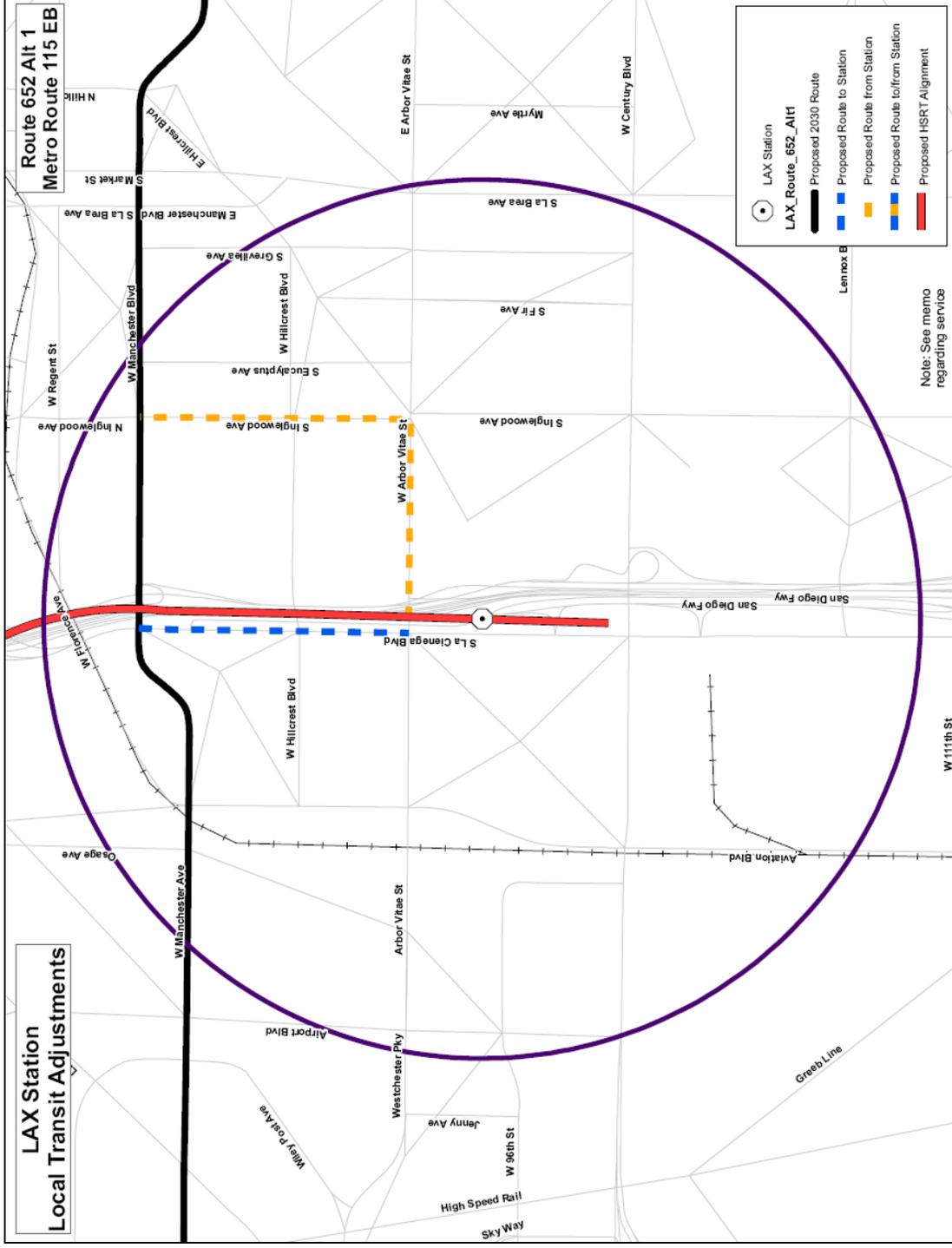


Figure 8.13 Adjustment to Metro Route 115, Eastbound

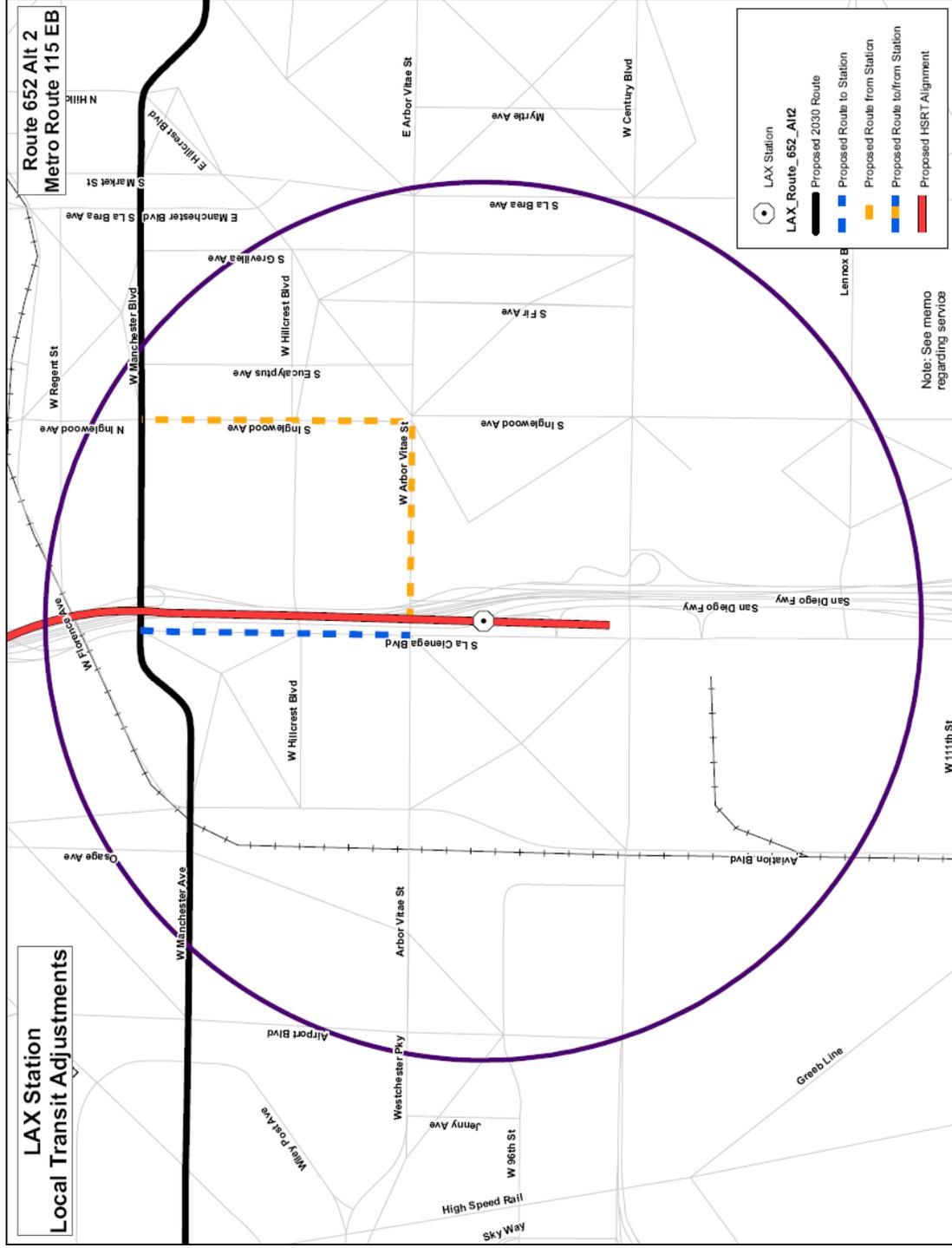


Figure 8.14 Adjustment to Metro Route 115, Westbound







Figure 8.17 Adjustment to Metro Route 117, Westbound

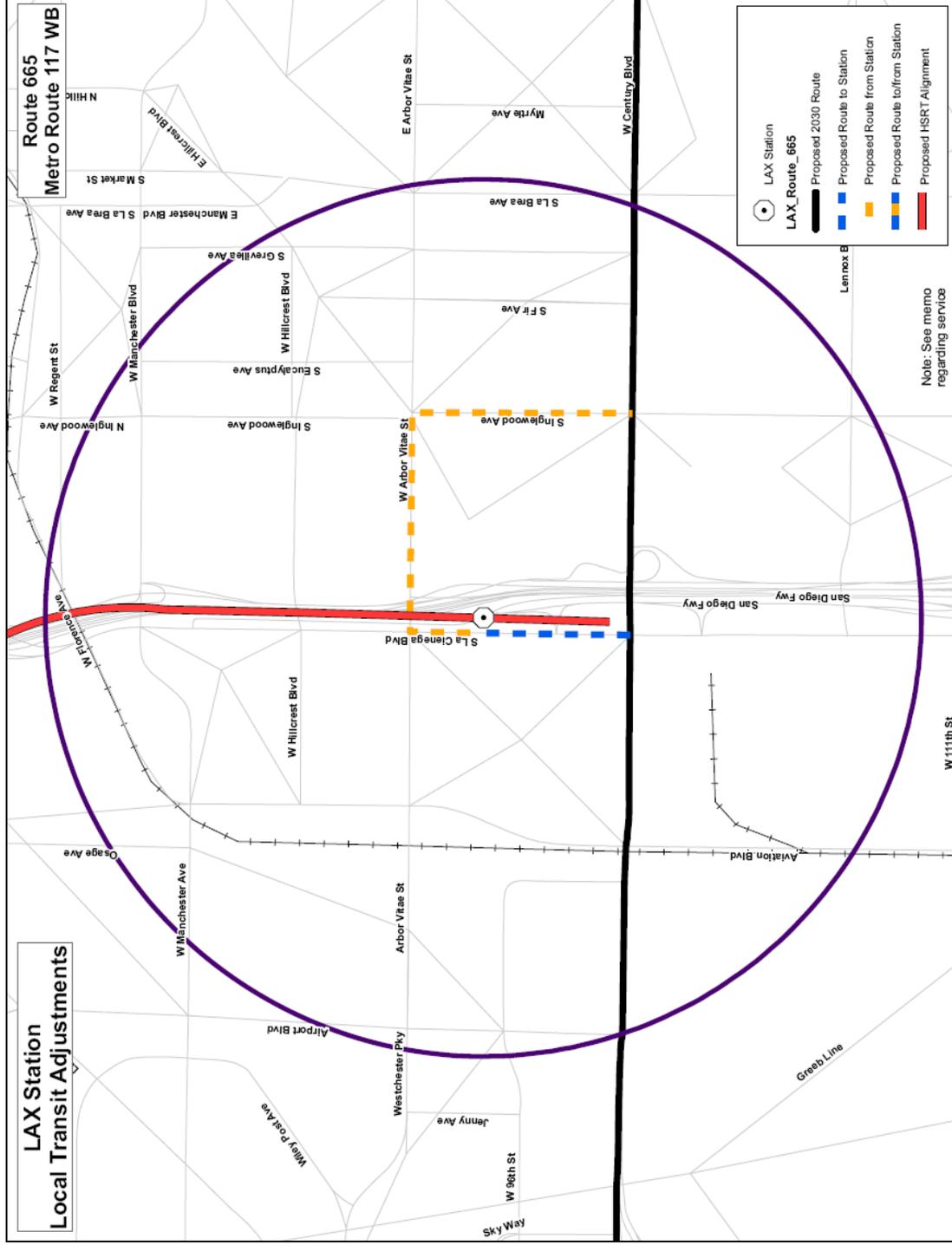




Figure 8.19 Adjustment to Metro Route 215 SB, Southbound

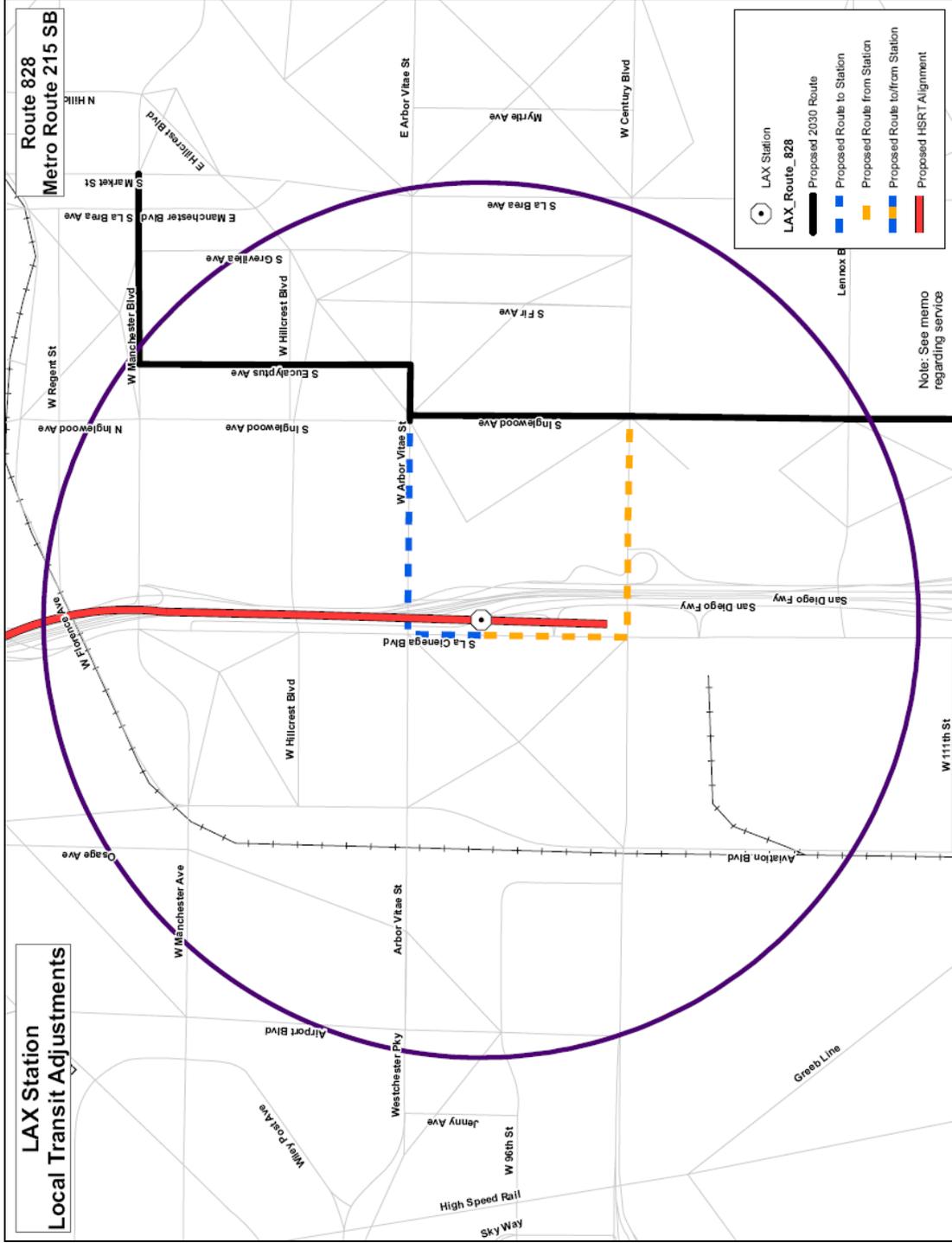


Figure 8.20 Adjustment to Metro Route 311, Eastbound

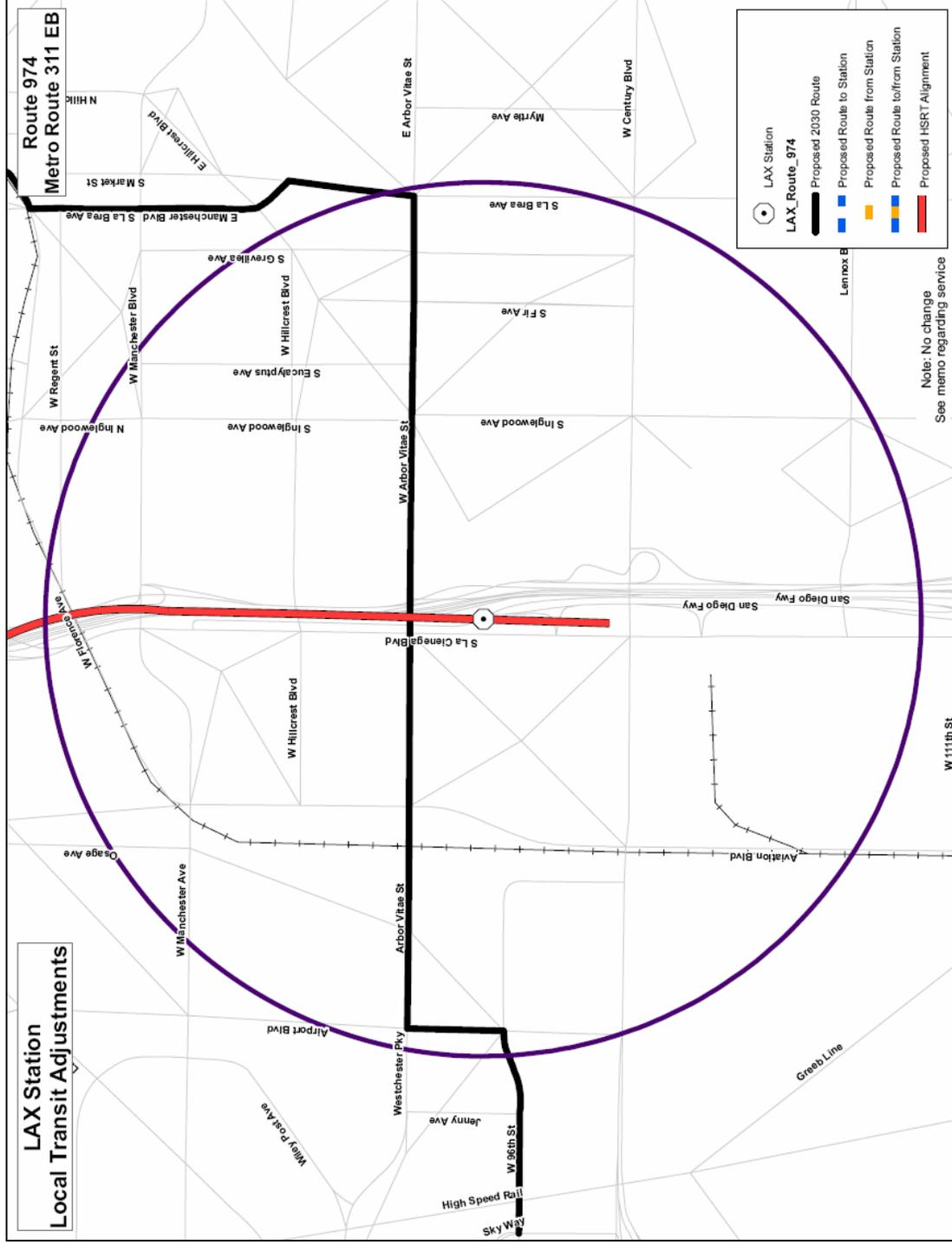


Figure 8.21 Adjustment to Metro Route 311, Westbound

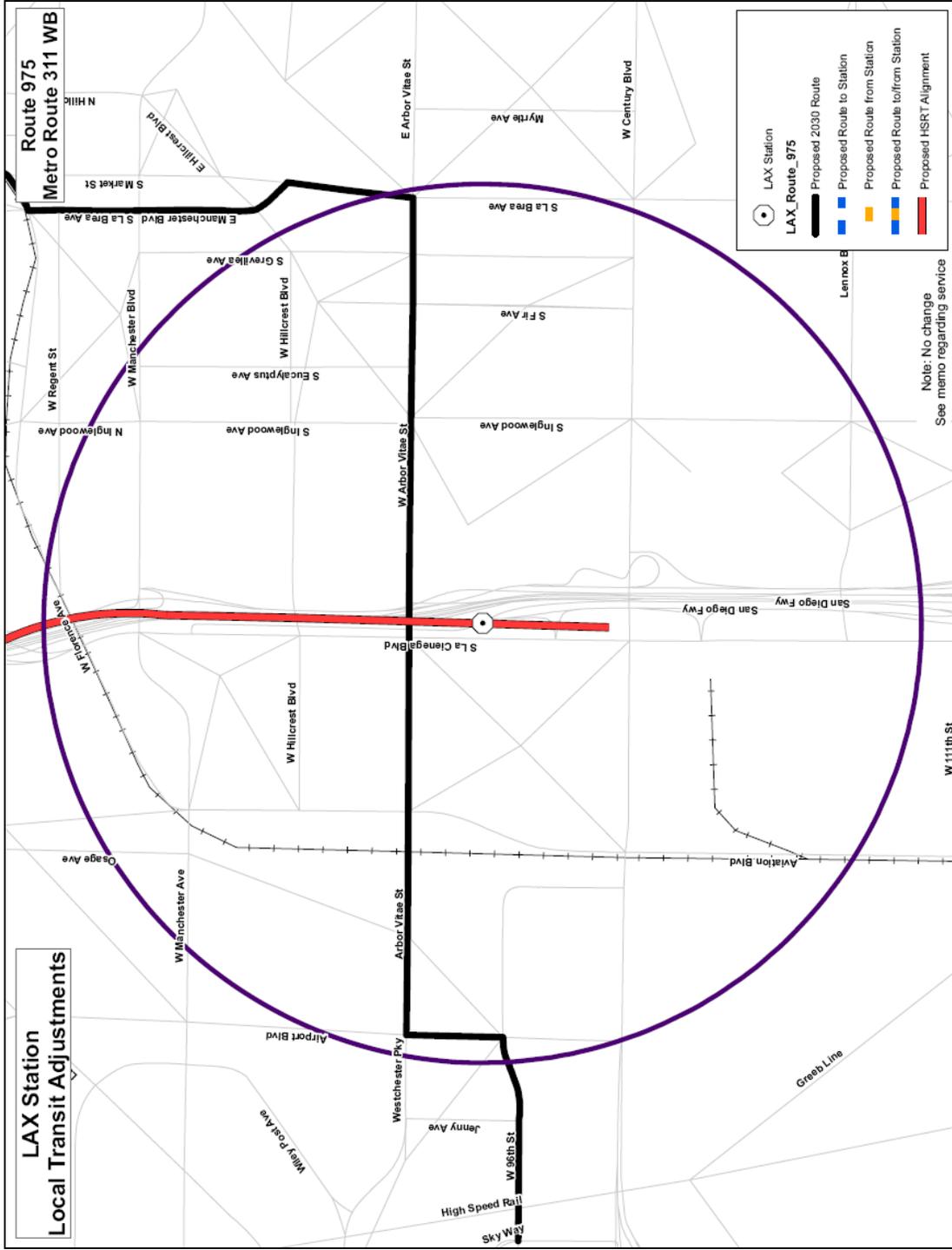


Figure 8.22 Adjustment to Metro Route 315, Westbound

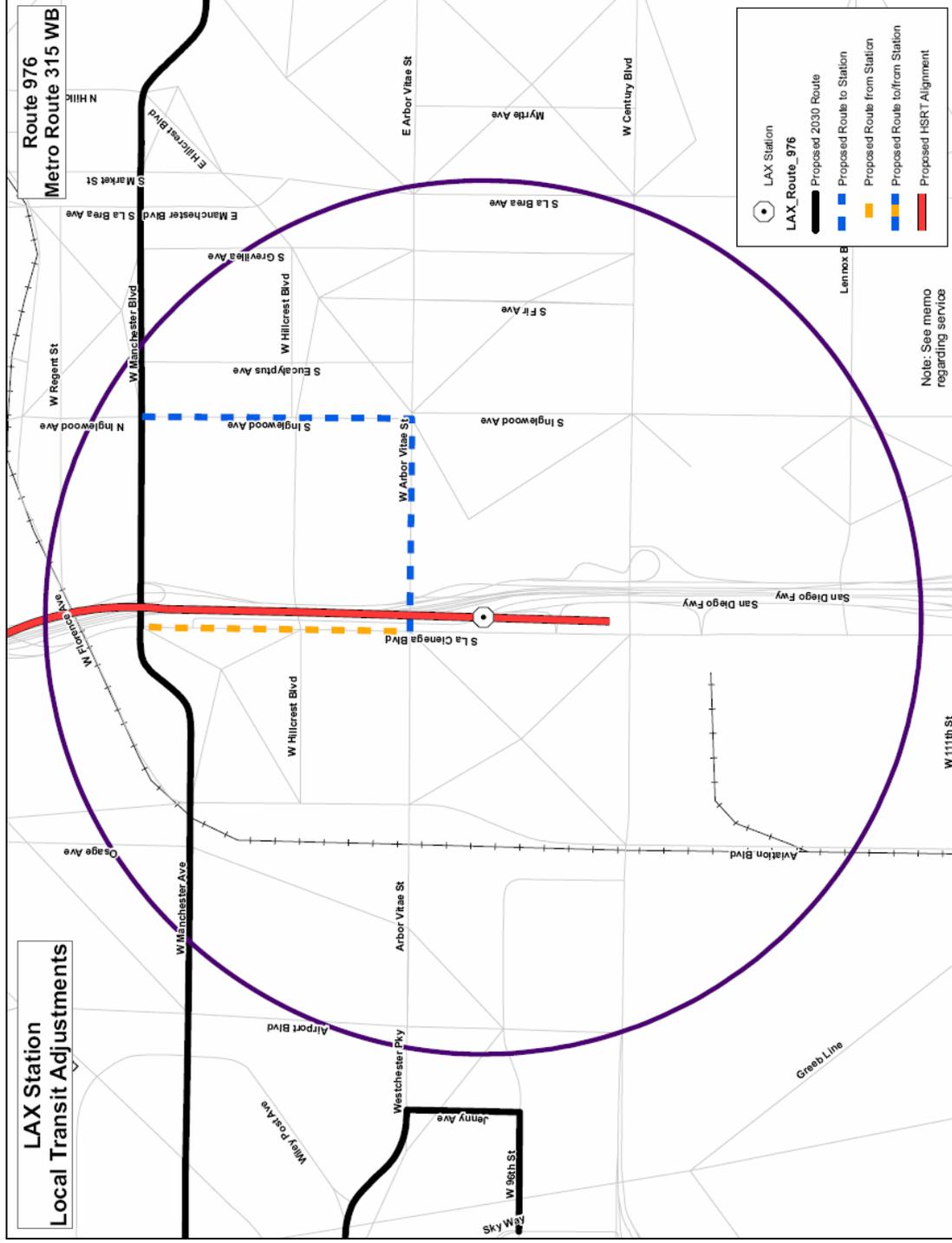
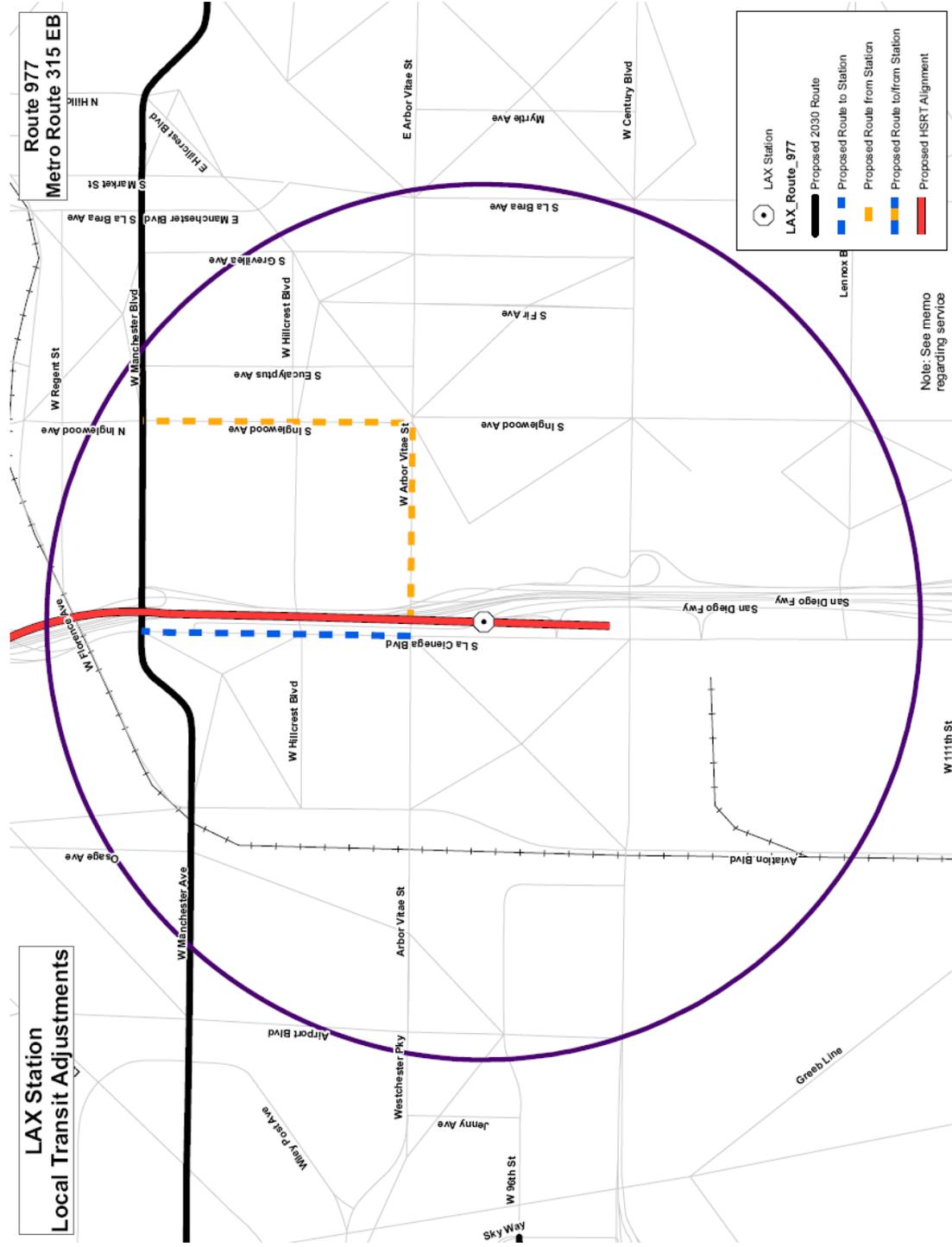


Figure 8.23 Adjustment to Metro Route 315, Eastbound



Note: See memo regarding service





Figure 8.26 Adjustment to Metro Route 40, Northbound Owl

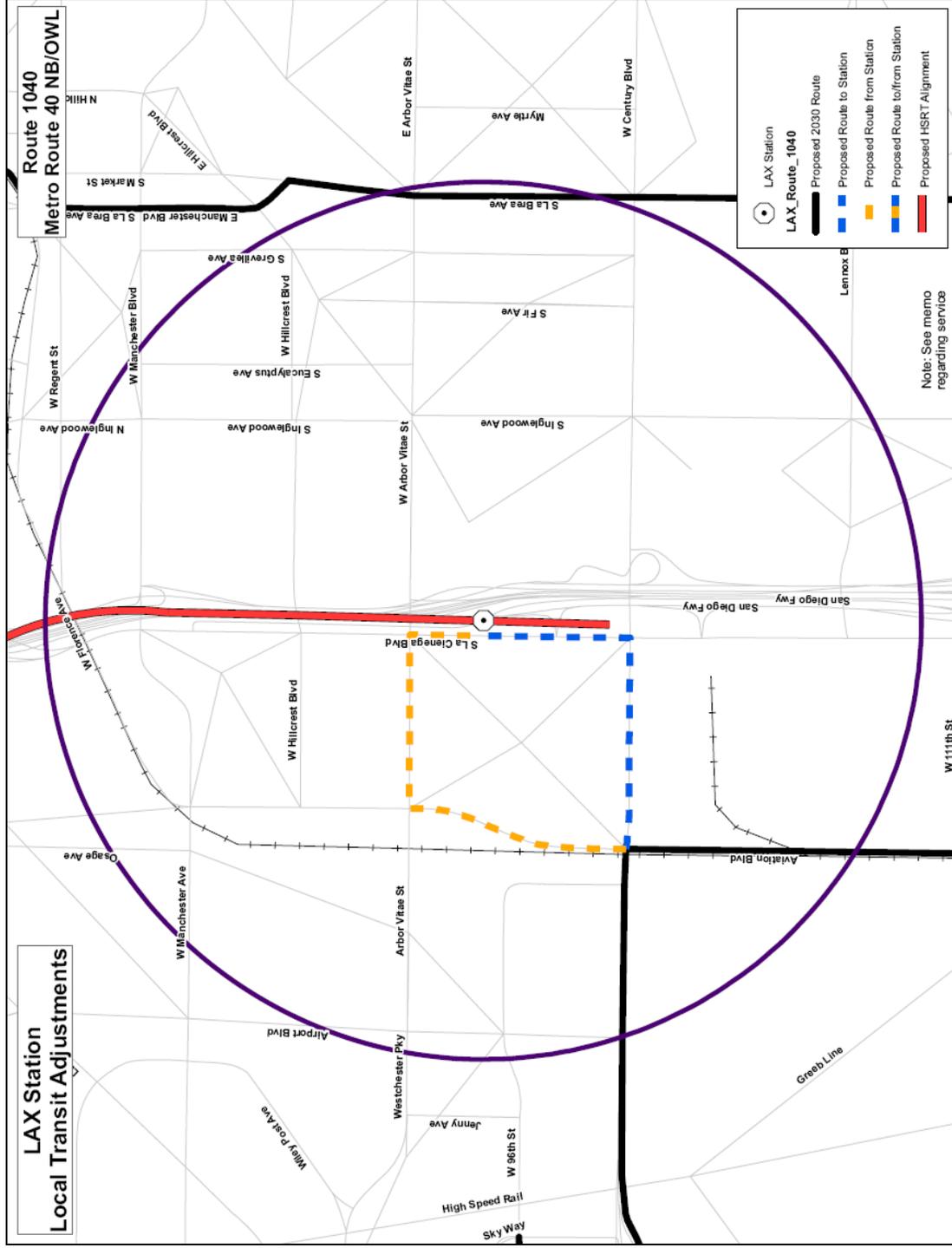


Figure 8.27 Adjustment to Metro Route 40, Northbound Owl

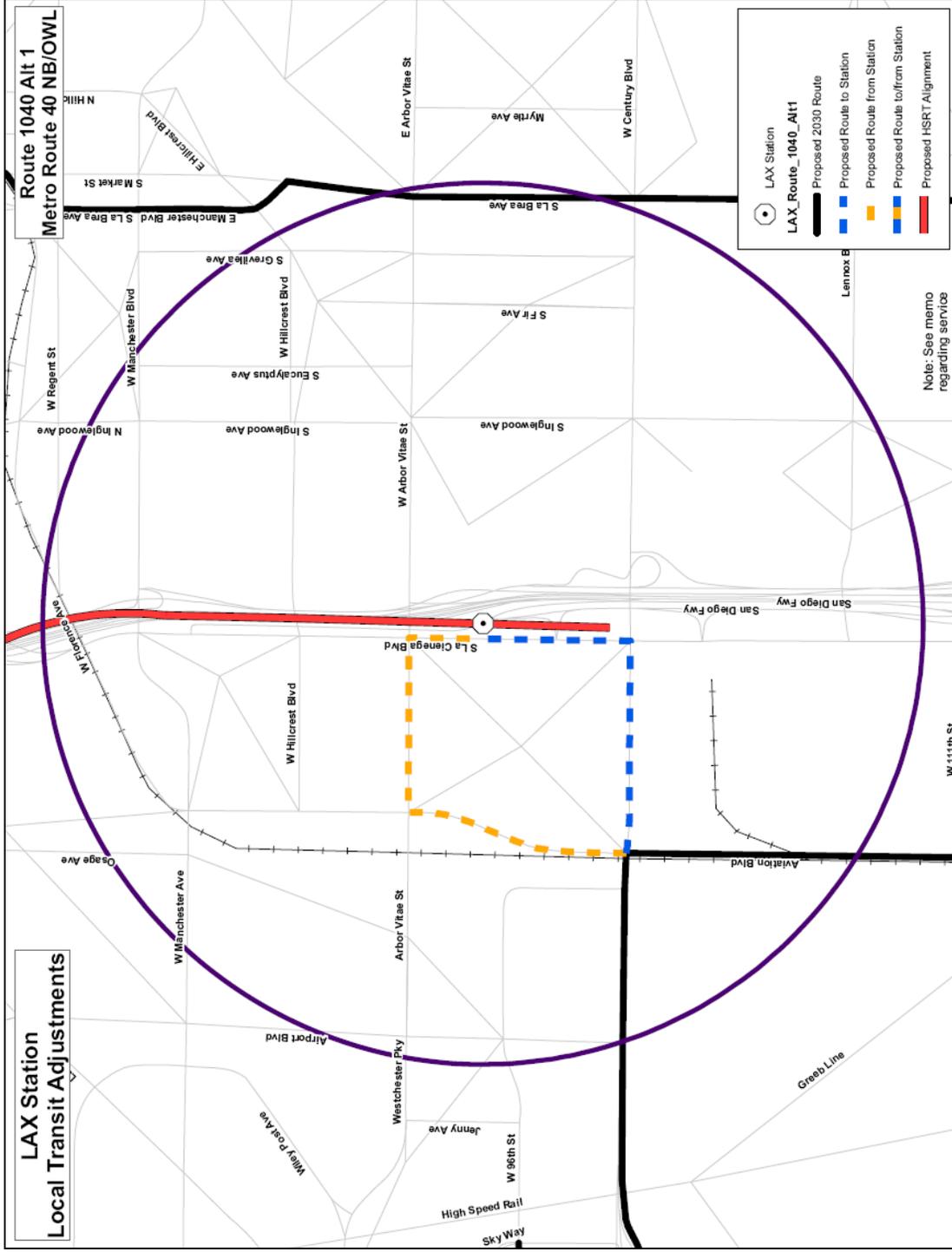


Figure 8.28 Adjustment to Metro Route 40, Southbound Owl



Figure 8.29 Adjustment to Metro Green Line Shuttle, Eastbound

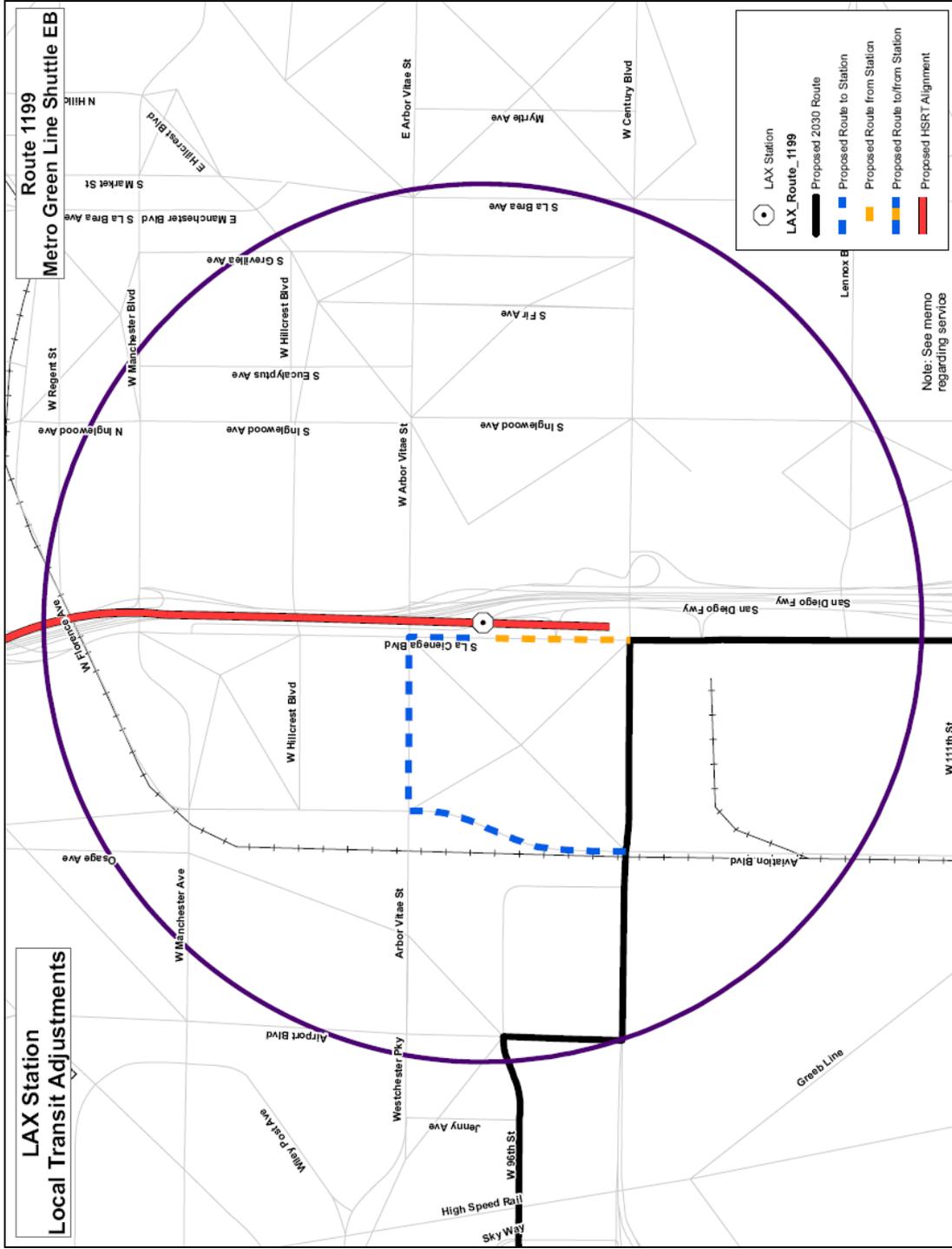


Figure 8.30 Adjustment to Metro Green Line Shuttle, Westbound

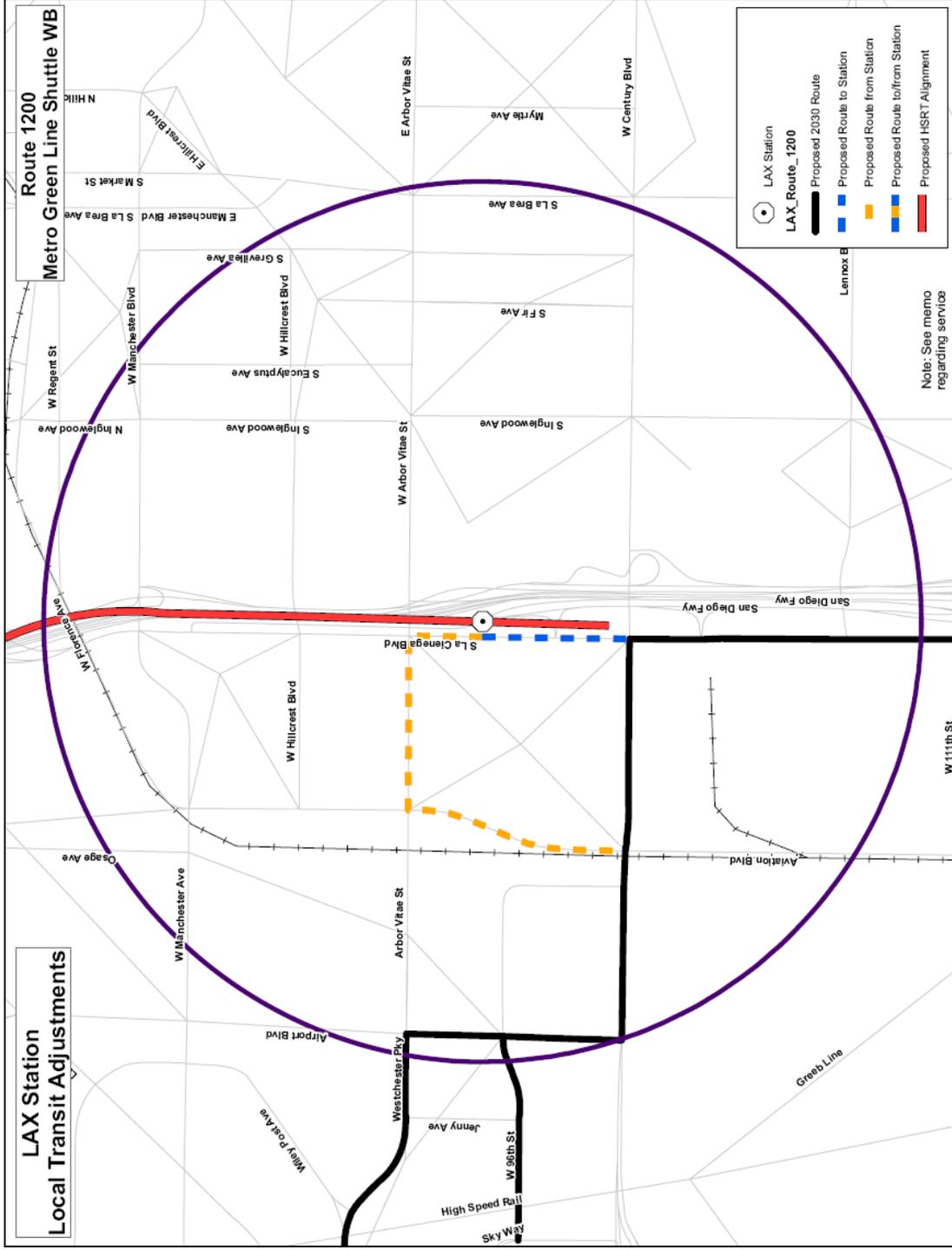


Figure 8.31 Adjustment to Metro Route 3, Southbound

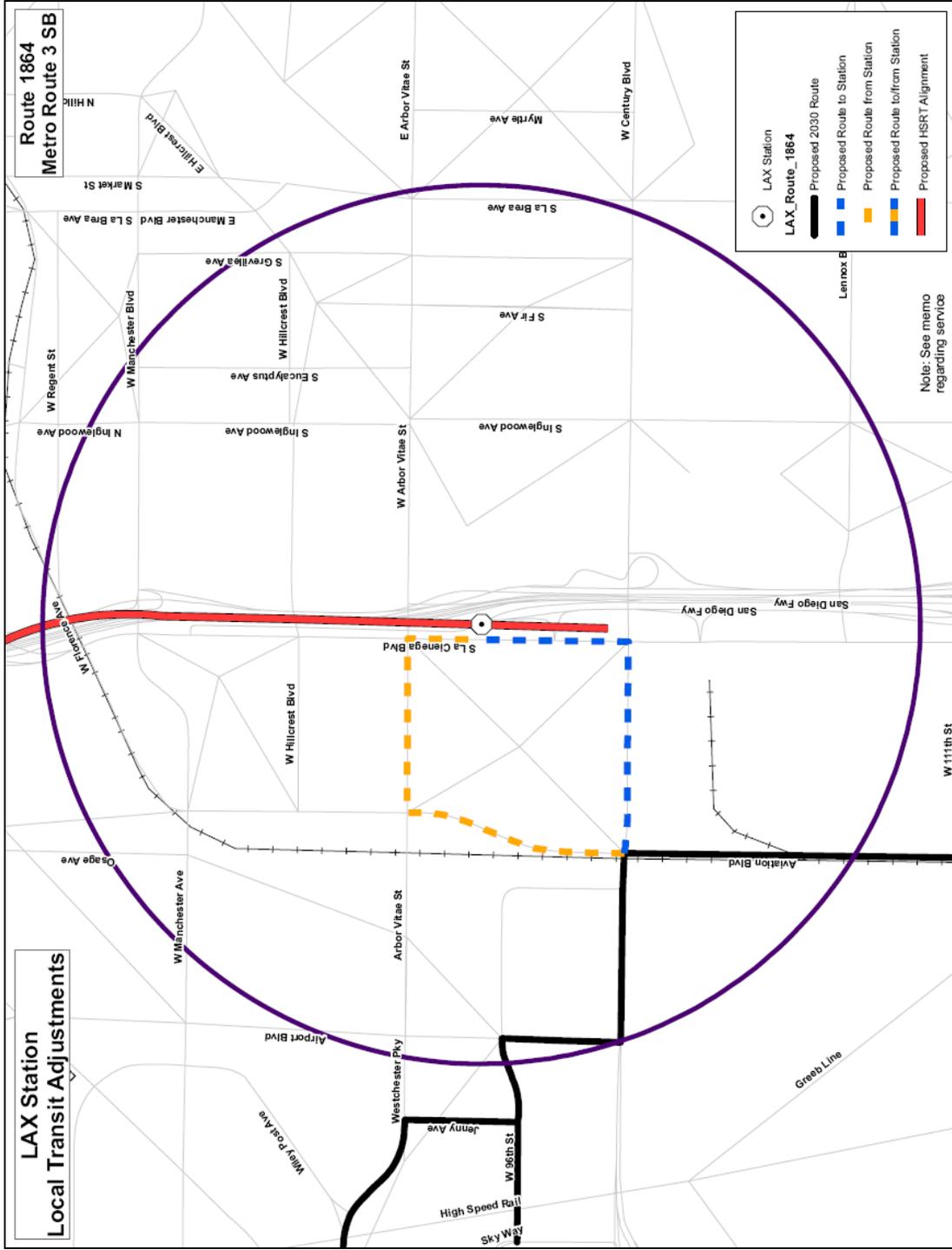


Figure 8.32 Adjustment to Metro Route 3, Southbound/1

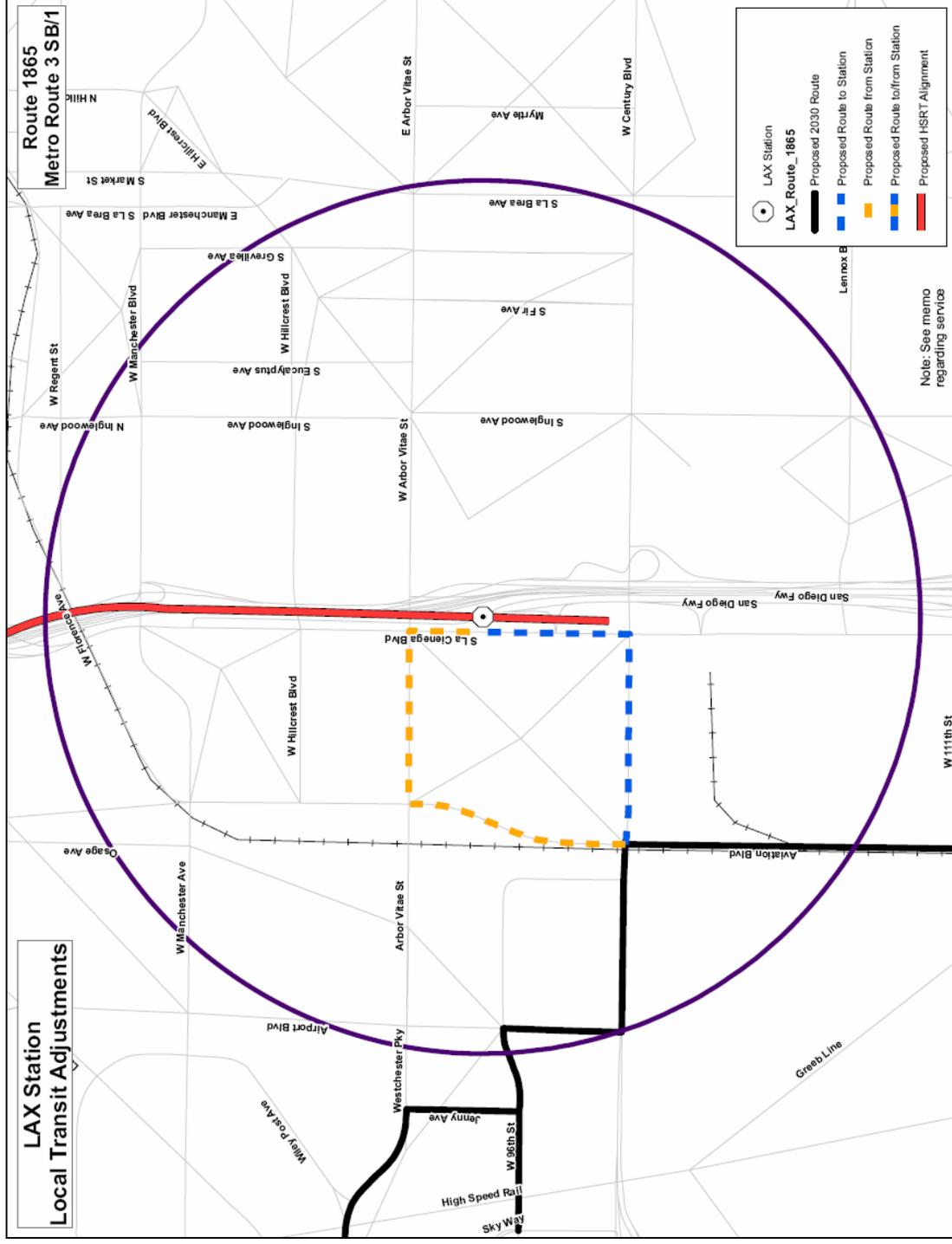
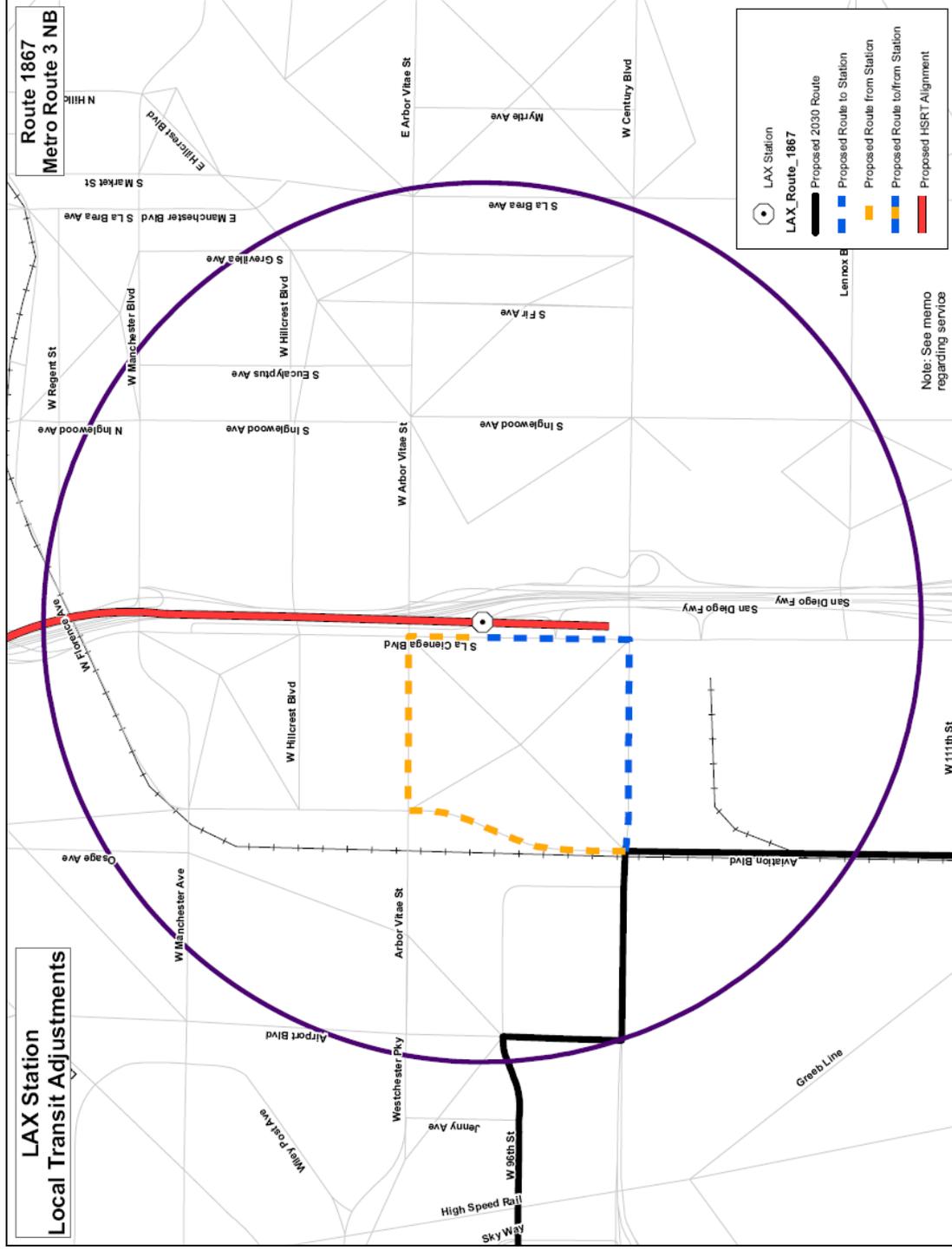




Figure 8.34 Adjustment to Metro Route 3, Northbound





## 9.0 Identification of Additional Stations

This section describes the process of identifying additional HSRT stations for the Maglev on I-10 alternative. The base Maglev on I-10 alternative has four HSRT stations, located at West LA, LAUS, West Covina, and Ontario Airport (see Section 2.0 of *High-Speed Regional Transportation System Alternatives Analysis Final Report, January 2009*).

A two-step process was used to identify the locations of additional HSRT stations. The first step identified relatively denser areas along the I-10 alignment by mapping forecasted population plus employment density in 2035. The second step performed a more detailed analysis of those areas considered denser in order to identify the specific locations for the additional HSRT stations. In this step, in addition to the population and employment density nearby, proximity to other transit services and engineering constraints such as alignment geometry and availability of right-of-way were considered.

Based on the analysis, three additional stations are proposed at the following locations (see Figure 9.1):

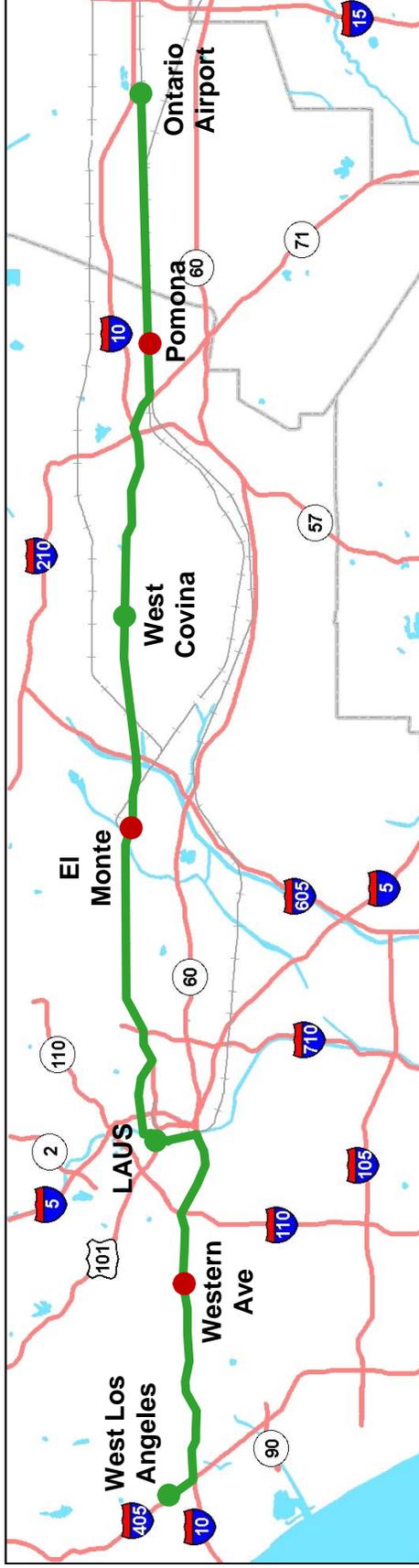
1. I-10 and Western Avenue, Los Angeles;
2. I-10 and Santa Anita Avenue, El Monte; and
3. UPRR tracks and Garey Avenue, Pomona.

### 9.1 STEP ONE – IDENTIFICATION OF RELATIVELY DENSER AREAS

The first step consisted of identifying relatively denser areas along the I-10 alignment. Figure 9.2 displays the population plus employment per square mile along the I-10 alignment in 2035. Relatively denser areas not already served by the four base HSRT stations include the following:

- **Central Los Angeles, roughly between I-405 and I-110.** Population plus employment density reaches over 30,000 per square mile in many parts of this area, particularly between La Brea Boulevard and I-110.
- **San Gabriel Valley, roughly between I-710 and I-605.** Relatively moderate to high density occurs in two areas, roughly surrounding the central parts of Monterey Park and El Monte.

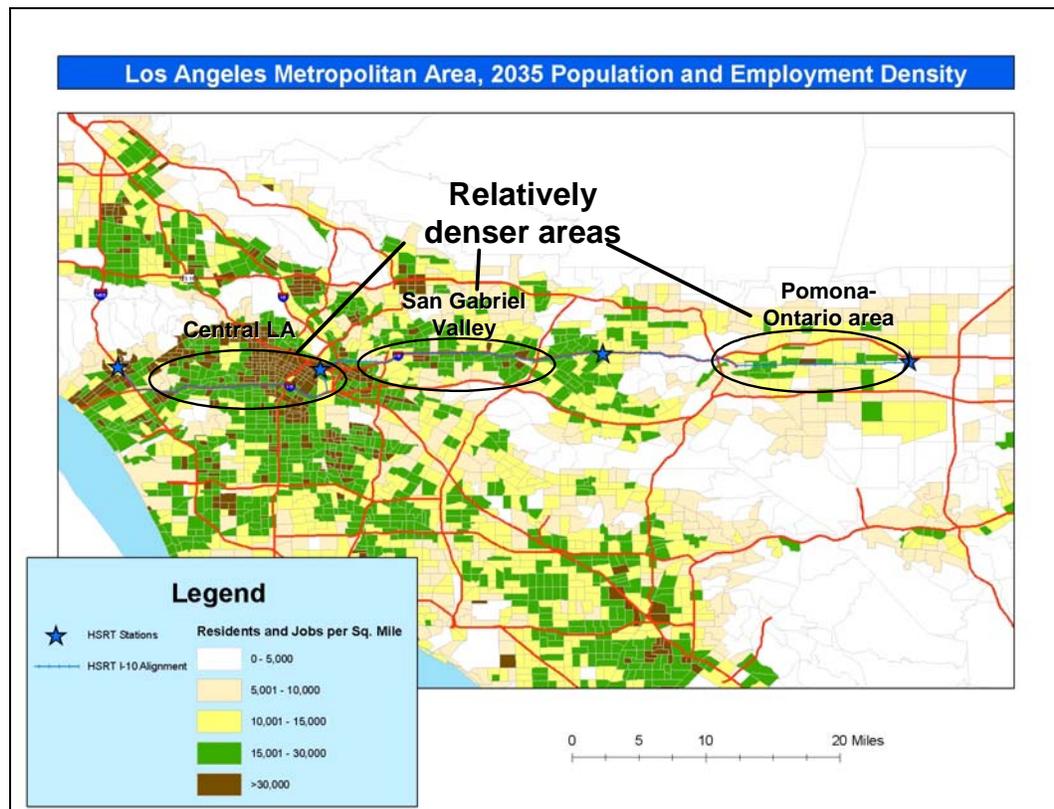
Figure 9.1 Additional HSRT Stations



| Legend   |                         |
|--|-------------------------|
|   | HSRT (I-10 Alignment)   |
|   | HSRT Station            |
|  | Additional HSRT Station |

- **Pomona-Ontario, roughly between SR 57 and Ontario Airport.** Population plus employment density is relatively moderate to low in this area, with some denser development surrounding the central parts of Pomona and Ontario.

Figure 9.2 Relatively Denser Areas Along I-10 Alignment



## 9.2 STEP TWO – DETAILED ANALYSIS OF RELATIVELY DENSER AREAS

### Central Los Angeles

As Figure 9.3 and Figure 9.4 show, Central Los Angeles is a trip generator rather than a trip attractor since its population density is much higher than its employment density. The additional HSRT station is at the intersection of the I-10 and Western Avenue, where the number of residents within 0.5 mile is expected to reach nearly 21,000 people and the number of jobs more than 4,000 by 2035. Three major bus lines currently serve this intersection: Metro Rapid 757, Metro Express 550, and Metro Local line 207. The HSRT alignment would require some straightening to accommodate a station in this location. The station

itself would likely be in an aerial structure traversing Western Avenue. Some existing buildings in the immediate vicinity of the HSRT station would likely be displaced to accommodate HSRT parking structures.

Another location considered was the intersection of I-10 and Vermont Avenue given the high levels of population density nearby. However Vermont Avenue has less transit connectivity, with only has one Metro Rapid Line (754) and one Metro Local line (204).

### **San Gabriel Valley**

As Figure 9.5 and Figure 9.6 show, the San Gabriel Valley is expected to be a trip generator rather than a trip attractor since its population density is much higher than its employment density. The proposed HSRT station is at the intersection of the I-10 and Santa Anita Avenue in El Monte where the number of residents within 0.5 mile radii is expected to reach more than 7,000 people and the number of jobs around 2,000 by 2035. Several bus lines serve the El Monte Transit Center at this location: Metro Rapid 770, Metro Local 70, Metro Express 484 and 490, Foothill Transit Silver Streak and several Foothill Transit local routes. The proposed HSRT station is also about three-quarter mile from the El Monte Metrolink station. The HSRT alignment would require some straightening to accommodate a station at this location. There is an existing MTA bus yard and facility to the west of Santa Anita Avenue just north of I-10. The HSRT station could be located in the back of this facility, with access via Santa Anita Avenue.

Figure 9.3 Central Los Angeles, 2035 Population Density

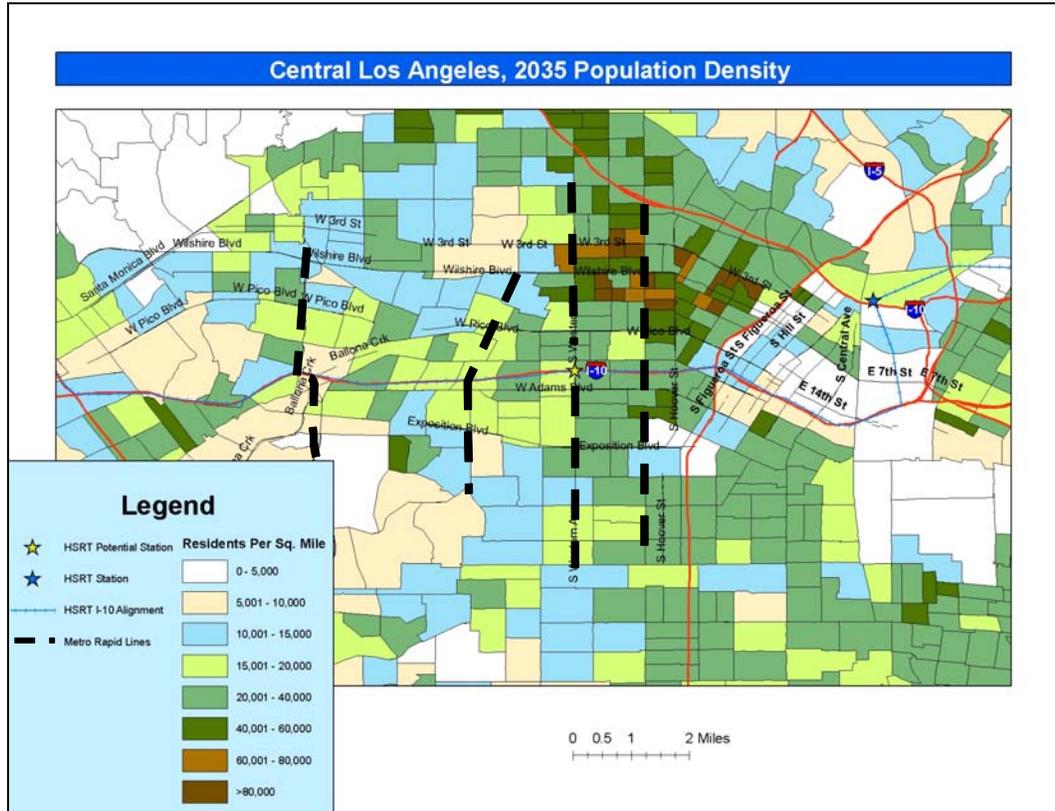


Figure 9.4 Central Los Angeles, 2035 Employment Density

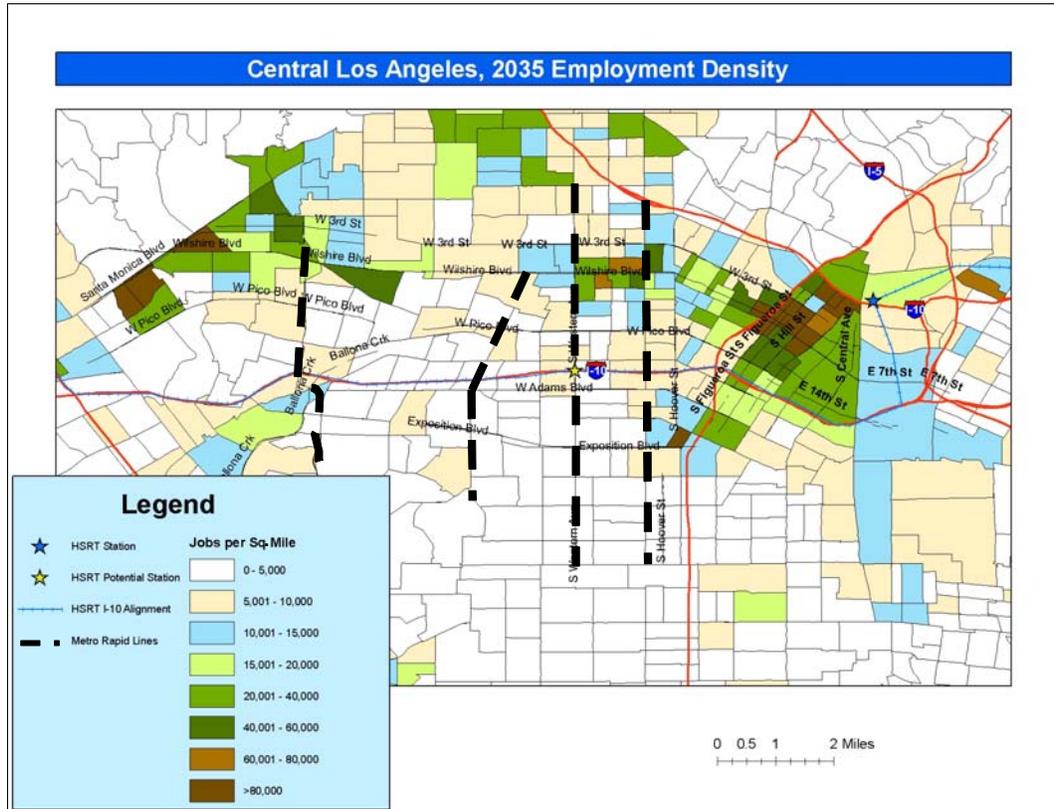


Figure 9.5 San Gabriel Valley, 2035 Population Density

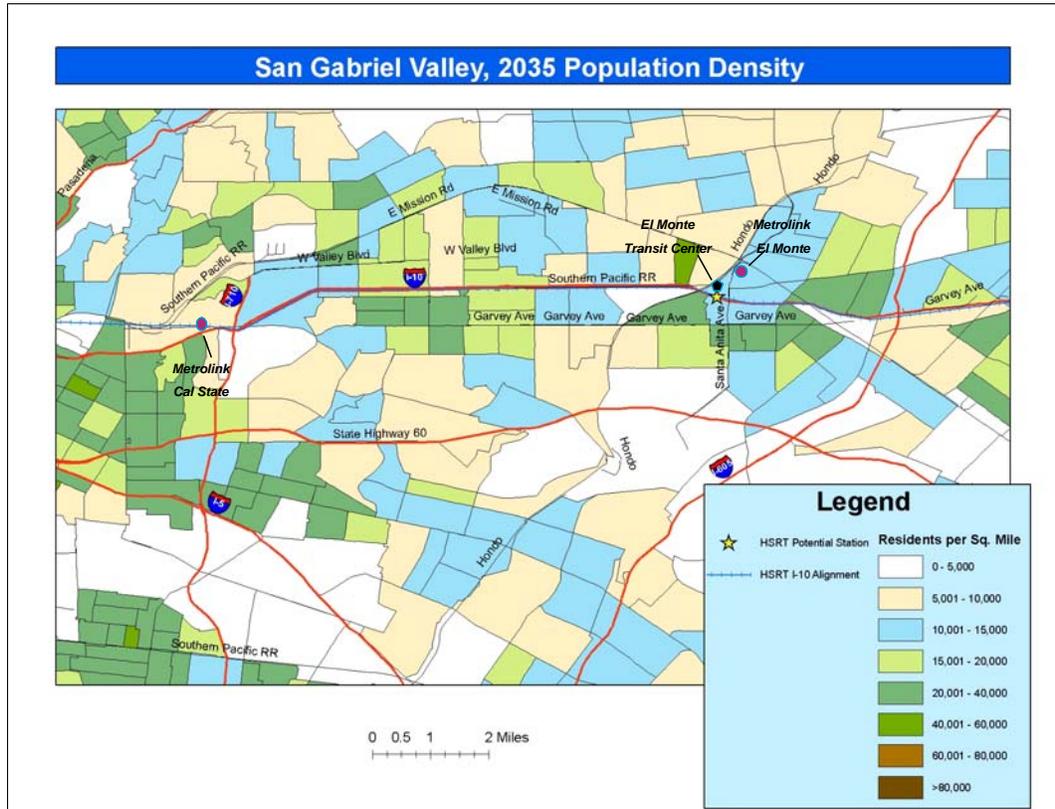
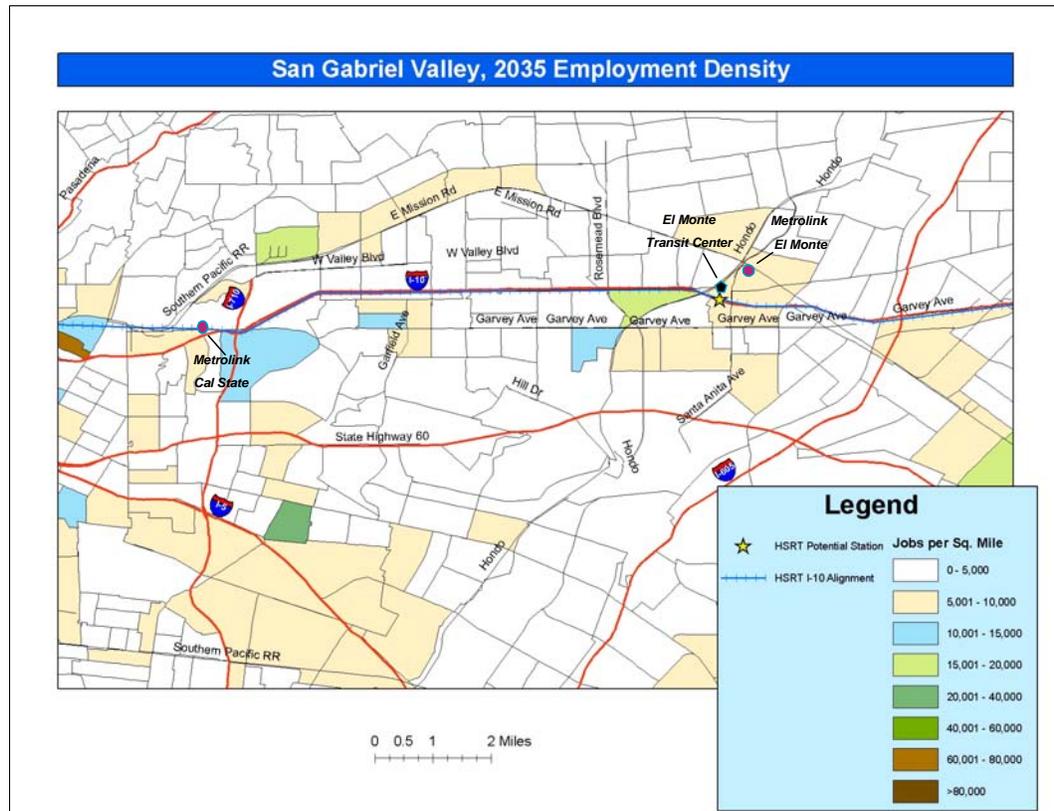


Figure 9.6 San Gabriel Valley, 2035 Employment Density



### Pomona-Ontario Area

As Figure 9.7 and Figure 9.8 show, the Pomona - Ontario area is expected to have modest population and employment density relative to Central Los Angeles and the San Gabriel Valley, with population density below 25,000 residents per square mile and employment density below 15,000 jobs per square mile in 2035. The proposed HSRT station is located in a relatively denser area, at the intersection of the UPRR tracks and Garey Avenue in Downtown Pomona. The number of residents within 0.5 mile or walking distance from the station is expected to reach 6,000 people and the number of jobs more than 8,000 by 2035. This location is currently a station on the Metrolink Riverside line and is also the Pomona Transit Center, with Foothill Transit Silver Streak bus service, as well as several Foothill Transit local routes. From an engineering perspective, building a HSRT station at this location is relatively straightforward.

Figure 9.7 Pomona-Ontario Area, 2035 Population Density

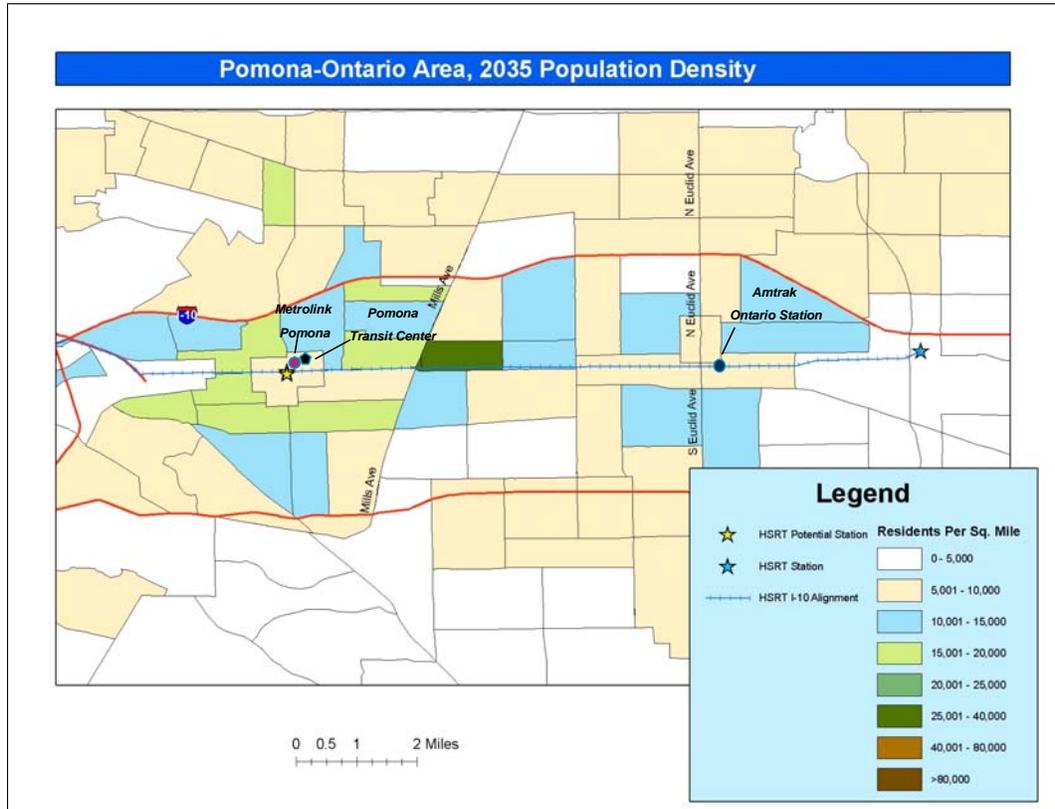
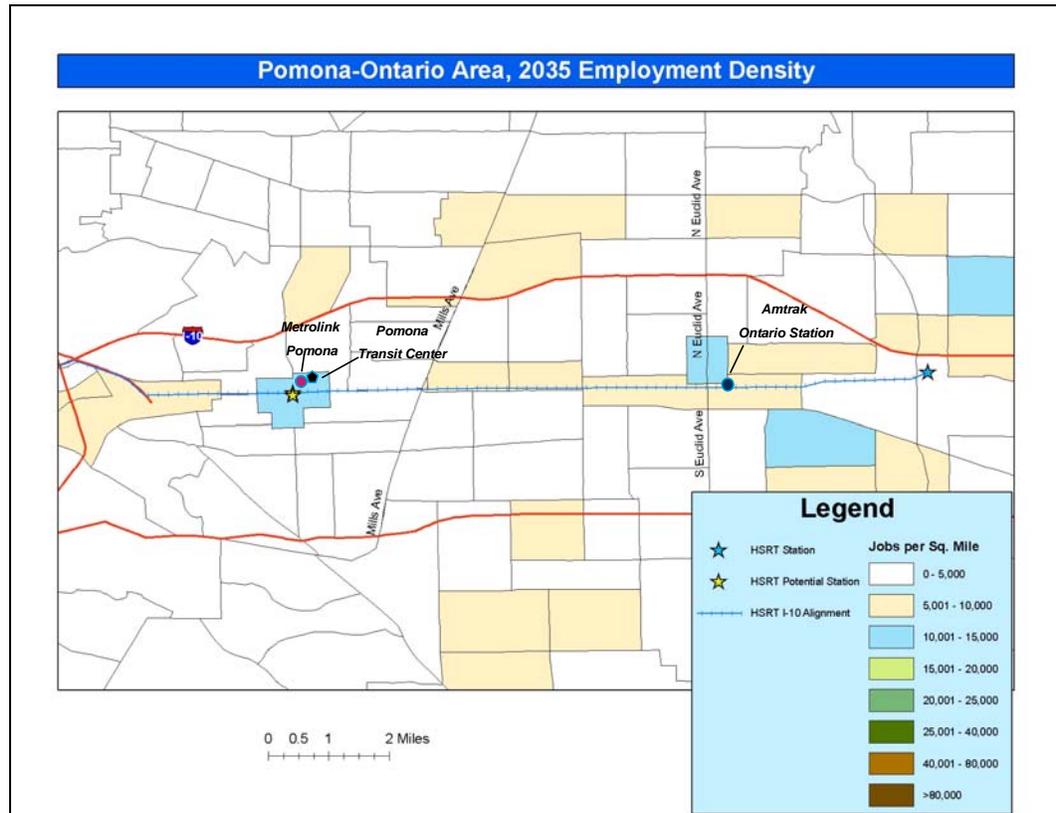


Figure 9.8 Pomona-Ontario Area, 2035 Employment Density



## 10.0 Benefit Assessment Districts and Tax Increment Financing

Benefit assessment districts and tax increment financing are two potential mechanisms for generating revenues from the potential benefits that a HSRT system might bring to the surrounding communities. Some of the differences between these two financing are:

1. The theory behind *benefit assessments* is that the public pays for benefits that they receive from an infrastructure improvement. A benefit assessment district could be formed in areas in which all business or property owners are determined to benefit equally from the HSRT line. A fee is assessed on all businesses or property owners in the district to finance the new rail infrastructure. Unlike tax increment financing, beneficiaries pay a new fee on top of existing taxes.
2. *Tax increment financing* does not impose additional fees. Instead, property tax revenues are frozen at a base year level and additional revenues are diverted into a separate pool to finance improvements. A tax increment financing district (typically a redevelopment agency or an infrastructure financing district) collects the incremental tax revenues generated and uses these revenues to repay project financing costs.

We examined the five station locations included in the IOS alignments along the I-10 and UPRR rights-of-way. We discovered that most of the cities already have redevelopment districts and agencies administering tax increment financing:

- **Los Angeles.** Community Redevelopment Agency (LA/CRA);
- **West Covina.** Redevelopment Agency of the City of West Covina;
- **City of Industry.** City of Industry Public Facilities Authority; and
- **Ontario Airport.** Ontario Redevelopment Financing Authority.

Only the proposed West Los Angeles HSRT station has no redevelopment district in its vicinity, and thus is a possible candidate for a new redevelopment district supporting HSRT.

With the help of SCAG staff, we reviewed annual reports and revenue bond issues from the redevelopment agencies. These documents indicate that the districts generate total net revenues of roughly \$60 million per year (in YOE dollars). Table 10.1 details some of the redevelopment projects already proposed to use these net revenues.

**Table 10.1 Redevelopment Projects near Proposed IOS HSRT Stations**

| Project Name   | Project Area  | Size                | Nature of Project   |
|--|---|---------------------|---|
| <b>City of Los Angeles Redevelopment Projects near Union Station</b> |   |                     |   |
| Central Industrial   | Area bounded by Third St on the north, LA River on the east, Washington Blvd and I-10 freeway on the south, and San Pedro and Stanford Streets on the west  | 738 acres           | <ul style="list-style-type: none"> <li>• Economic redevelopment</li> <li>• Affordable housing</li> </ul>  |
| Chinatown Redevelopment Project                                      | Area bounded by I-110 freeway on the north, North Broadway and North Main Street on the east, Cesar E. Chavez Avenue and I-5 on the south, and Beaudry Avenue on the west   | 303 acres           | <ul style="list-style-type: none"> <li>• Affordable housing</li> <li>• Cultural and historic preservation</li> </ul>  |
| <b>City of West Covina Redevelopment Projects</b>                    |   |                     |   |
| Glendora Avenue Retail   | Near I-10 freeway, across from The Lakes at West Covina and Edwards Cinema  | 7.01 acres          | <ul style="list-style-type: none"> <li>• Retail</li> </ul>  |
| Market Place II at The Lakes   | South end of The Lakes complex near I-10  | 12.67 acres         | <ul style="list-style-type: none"> <li>• Retail</li> </ul>  |
| K-Mart Plaza   | Part of Westfield Mall West Covina  | 11.92 acres         | <ul style="list-style-type: none"> <li>• Retail</li> </ul>  |
| Sunset/Francisquito Center   | Approximately 1 mile south of I-10 freeway  | 12.5 acres          | <ul style="list-style-type: none"> <li>• Retail/mixed-use</li> </ul>  |
| Sunset Parkway Center  | Adjacent to Westfield Mall West Covina  | 4.7 acres           | <ul style="list-style-type: none"> <li>• Retail</li> </ul>  |
| <b>City of Ontario Redevelopment Projects</b>                        |   |                     |   |
| Center City Project  | Historic Downtown Ontario, East Holt Blvd (gateway to Ontario Airport and the Ontario Convention Center), Ontario Hicy Hall, Civic Center, Senior Center, Main Library, the Museum of History and Art, and the Law School of the University of La Verne |                     | <ul style="list-style-type: none"> <li>• Corridor aesthetics improvements</li> <li>• Mixed-use urban village</li> </ul>   |
| Guasti Project   | 19 contiguous parcels between I-10 freeway and the Ontario Airport  | ~180 acres          | <ul style="list-style-type: none"> <li>• 100-unit senior housing</li> </ul>   |
| The Ontario Airport Towers Project                                   | Adjacent to I-10 freeway between Archibald and Turner Avenues, the main entrance to Ontario Airport   | 425,000 square feet | <ul style="list-style-type: none"> <li>• Two six-story and one five-story class A office buildings</li> <li>• Retail building and full service hotel</li> </ul> |

## 11.0 Potential for HSRT Goods Movement Revenue

This section presents the results of research and interviews conducted to evaluate the potential of the HSRT system to benefit small-package freight providers such as United Parcel Service (UPS) and Federal Express.

Representatives of UPS and Federal Express both believe that HSRT would not benefit their respective businesses due to the nature of their distribution systems.

### 11.1 UNITED PARCEL SERVICE

A discussion was held on June 13, 2006, with Mr. Bruce McRae, Public Affairs Manager for the UPS Pacific Region, to assess whether the proposed HSRT IOS system would benefit UPS' operations.

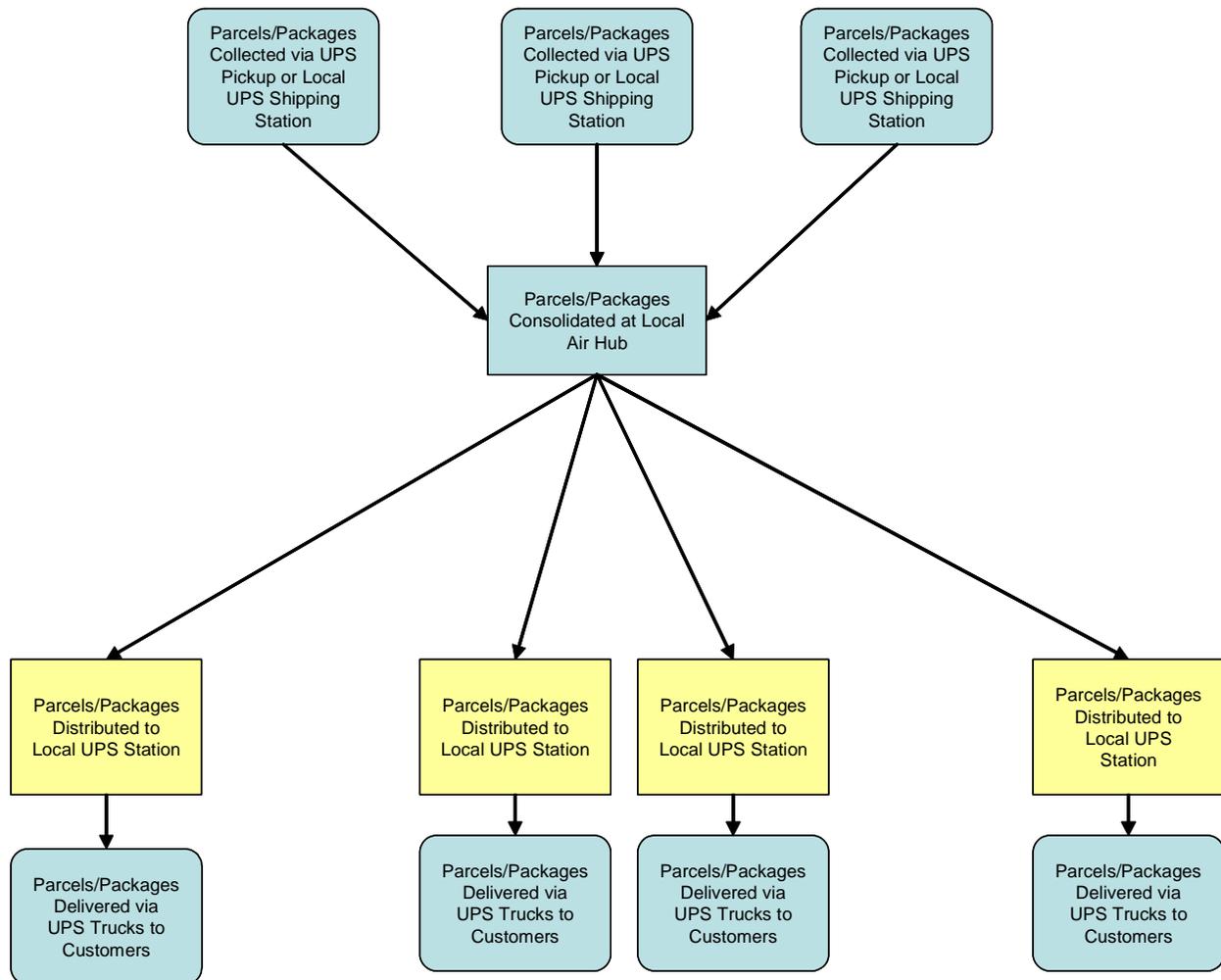
UPS operates a "hub-and-spoke structure" with three major components:

1. **Consolidation.** The first step involves the collection of parcels by trucks assigned to specific routes. Roadway conditions and traffic trends are continuously monitored to ensure that each driver takes the optimal path. From his/her truck, the driver has access to a hand-held computer device (DIAD) that enables the capturing of information about each package and delivery. The parcels are then assembled at the closest distribution center. There are many distribution centers in the Southern California region.
2. **Distribution.** The distribution function works on a hub-to-hub basis. Depending on the distance involved, the mode used between hubs will be truck or air. Trucks are predominantly used for distances less than 400 miles.
3. **Fragmentation.** This step is the inverse of consolidation as parcels have to be delivered to each individual destination. Commonly, fragmentation is combined with consolidation as a delivery truck route can be integrated with a pickup route.

UPS' main air hub in Southern California is at Ontario. As a result, discussions with Mr. McRae were focused mostly on the potential HSRT system between downtown Los Angeles and Ontario Airport.

Packages delivered by air to Ontario Airport are sorted through the system, loaded onto freight trucks, and delivered to multiple local UPS consolidation sites to be further sorted and loaded on different trucks for delivery to businesses or residential customers. The concept is depicted in Figure 11.1.

Figure 11.1 UPS Distribution Network



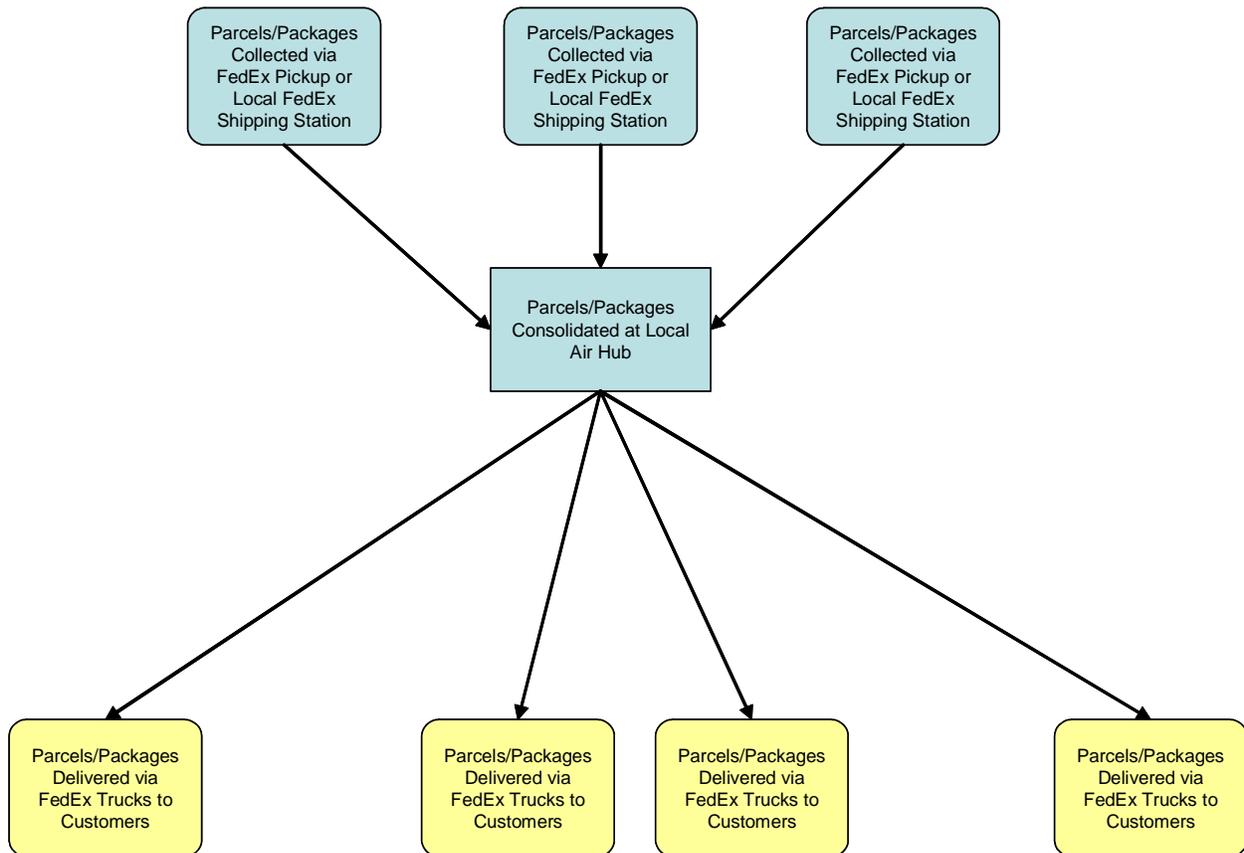
UPS' LAX hub operates in a similar fashion, but on a much smaller scale. Mr. McRae noted that UPS is already a significant user of freight rail services; and due to the multiple delivery operations required for each of the trucks, the HSRT system would not be a benefit to UPS. In fact, Mr. McRae pointed out that, since each of its packages are timed for delivery, the HSRT system, due to its concurrent passenger service, would most likely cause delays to its distribution system. However, the most important factor is that UPS distribution operations rely on multiple distribution centers located in different parts of Southern California. Therefore, a high-speed rail line connecting to one single point downtown would not add any efficiencies.

## 11.2 FEDERAL EXPRESS

A discussion was held on June 15, 2006, with Mr. Frank Adams of Federal Express. Mr. Adams is the Federal Express SCAG contact for the Maglev Task

Force, and is very familiar with the proposed development of a regional HSRT system. The Federal Express distribution system operates differently than the UPS hub-and-spoke system. Federal Express has air hubs at Ontario, Burbank, LAX, Long Beach, John Wayne, and San Diego in the Southern California area. Once a flight touches down at each of the airports, the packages are sorted into individual delivery vans that deliver to multiple locations within the designated delivery area. In addition, these delivery vans also pickup new packages for delivery along the way. The distribution system is shown in Figure 11.2.

Figure 11.2 Federal Express Distribution Network



Mr. Adams believes the HSRT system would not benefit Federal Express operations, since they do not have one or more centralized distribution centers. Also, there many available and proximate air hubs located throughout Southern California to service Federal Express' widespread delivery and pickup locations.